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2022
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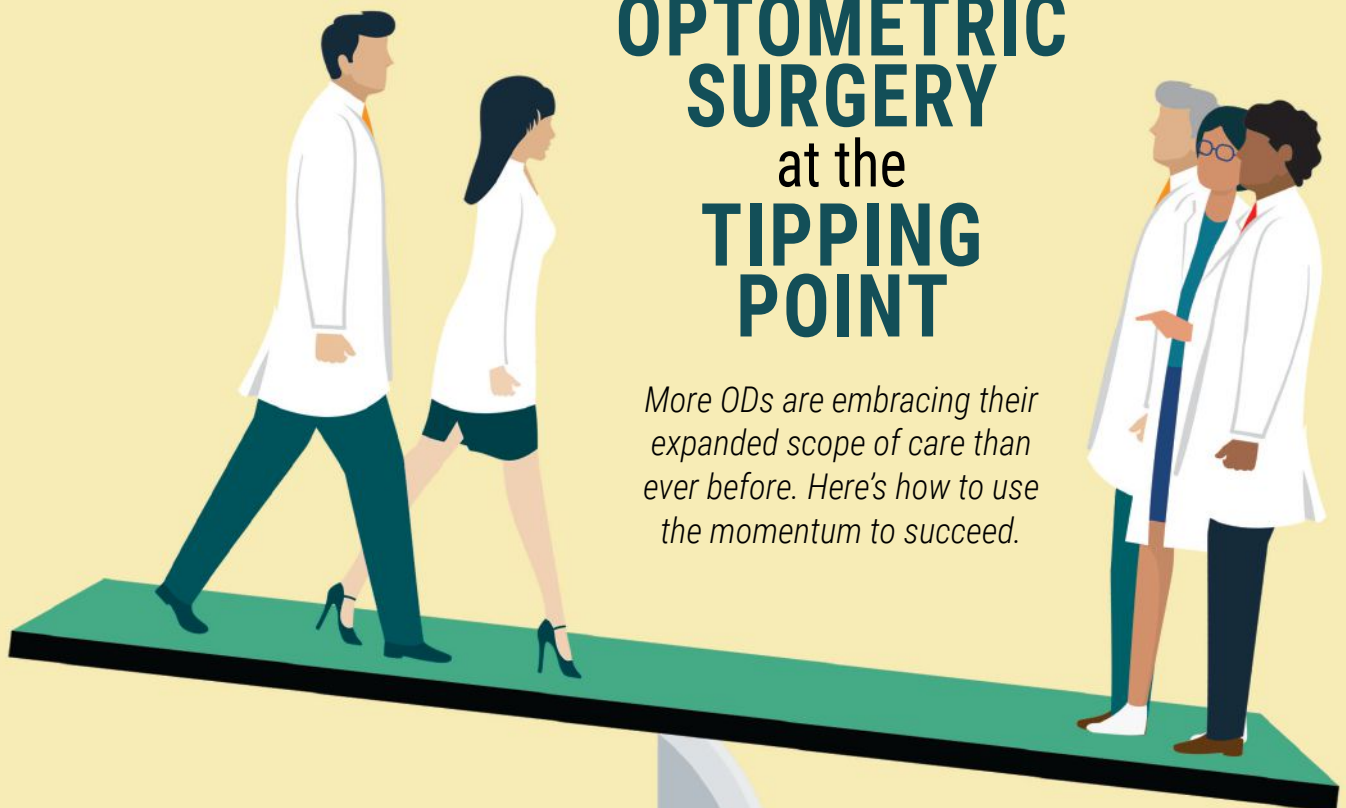
**ODs Work Smarter,
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PAGE 28

28th Annual **SURGERY REPORT**

OPTOMETRIC SURGERY at the TIPPING POINT

More ODs are embracing their expanded scope of care than ever before. Here's how to use the momentum to succeed.



Gearing Up for Laser and Minor Surgery:
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with Laser Capsulotomy
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An OD's Guide to
Using Lasers for Glaucoma
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When Selecting an Rx Treatment for Dry Eye Disease

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*Xiidra reduced symptoms of eye dryness at 2 weeks (based on Eye Dryness Score [EDS] compared to vehicle) in 2 out of 4 studies, with improvements observed at 6 and 12 weeks in all 4 studies.¹



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Indication

Xiidra® (lifitegrast ophthalmic solution) 5% is indicated for the treatment of signs and symptoms of dry eye disease (DED).

Important Safety Information

- Xiidra is contraindicated in patients with known hypersensitivity to lifitegrast or to any of the other ingredients.
- In clinical trials, the most common adverse reactions reported in 5-25% of patients were instillation site irritation, dysgeusia and reduced visual acuity. Other adverse reactions reported in 1% to 5% of the patients were blurred vision, conjunctival hyperemia, eye irritation, headache, increased lacrimation, eye discharge, eye discomfort, eye pruritus and sinusitis.
- To avoid the potential for eye injury or contamination of the solution, patients should not touch the tip of the single-use container to their eye or to any surface.



Novartis Pharmaceuticals Corporation
East Hanover, New Jersey 07936-1080



Not an actual patient.

Important Safety Information (cont)

- Contact lenses should be removed prior to the administration of Xiidra and may be reinserted 15 minutes following administration.
- Safety and efficacy in pediatric patients below the age of 17 years have not been established.

For additional safety information about XIIDRA[®], please refer to the brief summary of Prescribing Information on adjacent page.

†Pivotal trial data

The safety and efficacy of Xiidra were assessed in four 12-week, randomized, multicenter, double-masked, vehicle-controlled studies (N=2133). Patients were dosed twice daily. **Use of artificial tears was not allowed during the studies.** The study end points included assessment of signs (based on Inferior fluorescein Corneal Staining Score [ICSS] on a scale of 0-4) and symptoms (based on patient-reported EDS on a visual analogue scale of 0-100).¹

Effects on symptoms of dry eye disease: A larger reduction in EDS favoring Xiidra was observed in all studies at day 42 and day 84. Xiidra reduced symptoms of eye dryness at 2 weeks (based on EDS) compared to vehicle in 2 out of 4 clinical trials.¹

Effects on signs of dry eye disease: At day 84, a larger reduction in ICSS favoring Xiidra was observed in 3 of the 4 studies.¹

References: **1.** Xiidra [package insert]. East Hanover, NJ: Novartis Pharmaceuticals Corp. **2.** Data on file. Fingertip Formulary[®] as of 07/2022. Novartis Pharmaceuticals Corp; July 2022.

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XIIDRA® (lifitegrast ophthalmic solution), for topical ophthalmic use

Initial U.S. Approval: 2016

BRIEF SUMMARY: Please see package insert for full prescribing information.

1 INDICATIONS AND USAGE

Xiidra® (lifitegrast ophthalmic solution) 5% is indicated for the treatment of the signs and symptoms of dry eye disease (DED).

4 CONTRAINDICATIONS

Xiidra is contraindicated in patients with known hypersensitivity to lifitegrast or to any of the other ingredients in the formulation [see *Adverse Reactions (6.2)*].

6 ADVERSE REACTIONS

The following serious adverse reactions are described elsewhere in the labeling:

- Hypersensitivity [see *Contraindications (4)*]

6.1 Clinical Trials Experience

Because clinical trials are conducted under widely varying conditions, adverse reaction rates observed in clinical trials of a drug cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in practice.

In five clinical trials of DED conducted with lifitegrast ophthalmic solution, 1401 patients received at least one dose of lifitegrast (1287 of which received lifitegrast 5%). The majority of patients (84%) had less than or equal to 3 months of treatment exposure. One hundred-seventy patients were exposed to lifitegrast for approximately 12 months. The majority of the treated patients were female (77%). The most common adverse reactions reported in 5%-25% of patients were instillation-site irritation, dysgeusia, and reduced visual acuity.

Other adverse reactions reported in 1%-5% of the patients were blurred vision, conjunctival hyperemia, eye irritation, headache, increased lacrimation, eye discharge, eye discomfort, eye pruritus, and sinusitis.

6.2 Postmarketing Experience

The following adverse reactions have been identified during post-approval use of Xiidra. Because these reactions are reported voluntarily from a population of uncertain size, it is not always possible to reliably estimate their frequency or establish a causal relationship to drug exposure.

Rare serious cases of hypersensitivity, including anaphylactic reaction, bronchospasm, respiratory distress, pharyngeal edema, swollen tongue, urticaria, allergic conjunctivitis, dyspnea, angioedema, and allergic dermatitis have been reported. Eye swelling and rash have also been reported [see *Contraindications (4)*].

8 USE IN SPECIFIC POPULATIONS

8.1 Pregnancy

Risk Summary

There are no available data on Xiidra use in pregnant women to inform any drug-associated risks. Intravenous (IV) administration of lifitegrast to pregnant rats, from pre-mating through gestation day 17, did not produce

teratogenicity at clinically relevant systemic exposures. Intravenous administration of lifitegrast to pregnant rabbits during organogenesis produced an increased incidence of omphalocele at the lowest dose tested, 3 mg/kg/day (400-fold the human plasma exposure at the recommended human ophthalmic dose [RHOD], based on the area under the curve [AUC] level). Since human systemic exposure to lifitegrast following ocular administration of Xiidra at the RHOD is low, the applicability of animal findings to the risk of Xiidra use in humans during pregnancy is unclear [see *Clinical Pharmacology (12.3) in the full prescribing information*].

Data

Animal Data

Lifitegrast administered daily by IV injection to rats, from pre-mating through gestation day 17, caused an increase in mean pre-implantation loss and an increased incidence of several minor skeletal anomalies at 30 mg/kg/day, representing 5,400-fold the human plasma exposure at the RHOD of Xiidra, based on AUC. No teratogenicity was observed in the rat at 10 mg/kg/day (460-fold the human plasma exposure at the RHOD, based on AUC). In the rabbit, an increased incidence of omphalocele was observed at the lowest dose tested, 3 mg/kg/day (400-fold the human plasma exposure at the RHOD, based on AUC), when administered by IV injection daily from gestation days 7 through 19. A fetal no observed adverse effect level (NOAEL) was not identified in the rabbit.

8.2 Lactation

Risk Summary

There are no data on the presence of lifitegrast in human milk, the effects on the breastfed infant, or the effects on milk production. However, systemic exposure to lifitegrast from ocular administration is low [see *Clinical Pharmacology (12.3) in the full prescribing information*]. The developmental and health benefits of breastfeeding should be considered, along with the mother's clinical need for Xiidra and any potential adverse effects on the breastfed child from Xiidra.

8.4 Pediatric Use

Safety and efficacy in pediatric patients below the age of 17 years have not been established.

8.5 Geriatric Use

No overall differences in safety or effectiveness have been observed between elderly and younger adult patients.

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Axis of Astigmatism Can Change From Mask Wear

It's possible that rigid facial coverings induce compressive force on the lower eyelid, changing corneal shape, a team speculates.

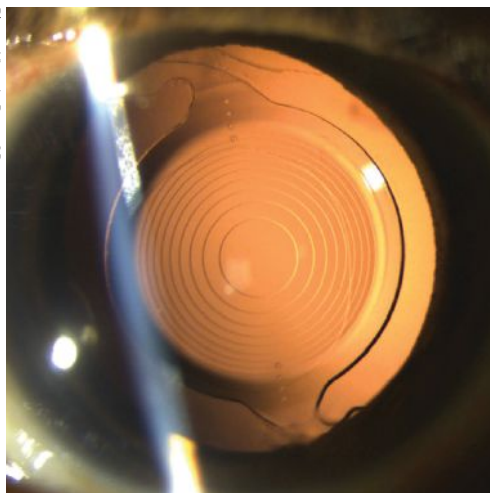
With the rise of the COVID pandemic came unforeseen ocular consequences. Some reports have been published detailing how mask wear can adversely impact ocular examination, including worse subjective dry eye symptoms, intraocular pressure measurement errors, visual field testing disturbance and choroidal thickness increase with KN95 mask prolonged usage.

With much more to learn about a mask's effects on eyes, one new study wanted to assess whether mask wear affected corneal topography and tomography readings. For the cornea service at Bascom Palmer Eye Institute, the thought occurred after observing multiple patients having trouble with getting corneal surface mapping measurements during mask wear, as the device interface was giving error readings. With mask readjustment or removal, the issue resolved.

The prospective study included 52 eyes in all. Imaging was performed without a mask. The same imaging was then repeated wearing different kinds of masks, including a Halyard Level 2, Halyard Level 3 and KN95. The measurements were compared by mask wear status and clinically significant changes were recorded for axis of astigmatism, magnitude of astigmatism and mean keratometry value.

While mask wear did not result in notable differences in topography or

Photo: Victoria Roan, OD



In patients with astigmatism, mask-induced axis change could complicate the precision of toric IOL calculations, affecting outcomes.

tomography measurements, 53% of participants displayed a greater than 10-degree change in axis of astigmatism for topography measurements and 41% displayed a greater than 15-degree change, both while wearing a mask.

These findings were less prevalent in the tomography data, with only 19% displaying greater than 10-degree change and 13% displaying greater than 15-degree change. However, the tomography changes were more likely to happen in the against-the-rule astigmatism group.

Furthermore, about a third of participants showed greater than 0.5D change in their K reading on tomography. Generally, topography was sensitive to mask-wear inducing changes of axis of astigmatism, while tomography was sensitive to magnitude of astigmatism.

Based on these findings, the researchers conclude, in a paper for *Journal of Cataract & Refractive Surgery*, that “mask wear changed the axis of astigmatism by an amount (>10° and >15°) that could impact toric intraocular lens (IOL) axis placement, overall toric IOL effect and refractive surgery targets.” Because of this possibility, the researchers warn that errors in measurement such as the ones observed here could result in suboptimal astigmatic correction and unsatisfactory visual outcomes.

The authors identified a few potential factors that may contribute to the impact of mask-wear on corneal shape. For example, greater mask rigidity, especially in ones with metal wire over the nasal bridge, could add compressive force on the lower lid and result in a greater effect on corneal shape. Conversely, masks with looser fits could contribute to tear abnormalities through escaped air in the space between the mask borders hitting the ocular surface.

With all this in mind, the authors advise that “axis determination should be interpreted with caution with respect to refractive surgery and/or toric IOL planning in individuals whose measurements were obtained while wearing a mask.” Additional research is needed to determine if long duration of mask wear further relates to transient or long-term corneal shape, they advise. ◀

Zein M, Wylegala A, Sripawadkul W, et al. Corneal topography and tomography readings with mask-wear. *J Cataract Refract Sug.* November 16, 2022. [Epub ahead of print].

Glaucoma Detectable 10 Years Before Clinical Manifestations

Study authors envision a process for more routine early screening of the general population, likely at five-year intervals.

With glaucoma being one of the most common causes of blindness worldwide, doctors and patients alike would benefit from more robust screening efforts to potentially allow intervention before the disease manifests clinically, at which point irreversible damage has already occurred. An earlier trial demonstrated a 50% reduction of glaucoma-related blindness in a population that was routinely screened. A new study in *JAMA Ophthalmology* looks to expand on this by identifying the “preclinical detectable phase” (PCDP) of open-angle glaucoma, a component essential for planning and early evaluation of screening programs; the concept of PCDP-guided screening has been proven valuable in cancer detection.

The researchers conducted a retrospective medical record review of a large population-based screening for glaucoma conducted on 32,918 individuals, which yielded 2,029 glaucoma patients. The team then assessed new case prevalence at screening time and the expected clinical incidence, which is the number of new glaucoma cases that could be anticipated without screening. Main findings included a mean age of screening at 67.4 years and a mean PCDP length of 10.7 years for the entire study population, while the

prevalence/incidence method yielded a mean PCDP of 10.1 years.

The authors explain that “estimates of the length of the PCDP are important for early estimation of the expected effectiveness of screening, for decisions regarding optimum screening intervals, and for estimation of the amount of overdiagnosis.”¹

They further elaborate that a shorter PCDP would indicate more rapid disease development into clinical stages, and thus more frequent screening would be necessary to achieve the same effect. Seen here, though, is a longer PCDP, meaning only relatively infrequent screening would be necessary, about once every five years, the authors concluded.

They also explain that an optimum interval between repeated screenings depends on age, sensitivity to screening, disease severity of interval cases and the mean PCDP.

With the practical application of this screening type still undecided, the authors noted that “we have not tried to analyze whether screening is cost-effective, but our results suggest that screening for open angle glaucoma, if repeated, could be done with relatively long intervals.”¹

In a notable shortcoming, the study in question used data from a very specific cohort: an all-white Swedish population. This is one point that was emphasized by an invited commentator on the article, who pointed out that the age-dependent time course of open angle glaucoma will vary for other ethnic and racial groups.

As well, almost 80% of the general population invited for screening in the study participated and, of those, all received care at one institution. The author of the commentary noted that this rate of adher-

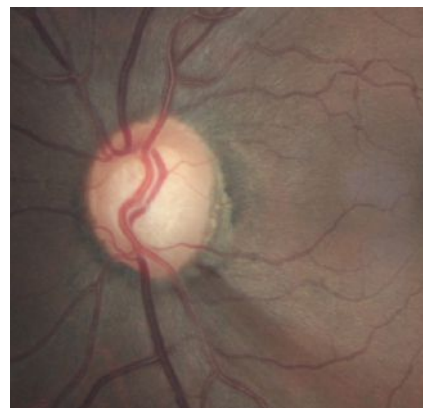


Photo: Joseph W. Sowka OD

There is a need to implement more frequent screening programs for glaucoma, especially since research showed the disease is detectable in its preclinical stage.

ence would not be expected in most cultures and that the comprehensive examinations given are not routine for eye care.

Despite the study’s potentially limited applicability in diverse patient populations, the commentator still believes that “this is a helpful initial insight for our [duty to consider] the value, frequency, content and appropriateness of using sophisticated approaches to screen for POAG.”²

Both authors of the original study and the commentary see usage of this early development as beneficial. The commentator simply adds that “similar data are needed on other populations, which will vary with the efficacy and use of routine, comprehensive eye care services [...] the ethnic and racial incidence and course of POAG in those populations, their adherence to recommended screening programs and the cost and accuracy of such sophisticated screening in the local context.”² ◀

1. Asperg J, Heijl A, Bengtsson B. Estimating the length of the preclinical detectable phase for open-angle glaucoma. *JAMA Ophthalmol*. November 23, 2022. [Epub ahead of print].

2. Sommer A. Screening for primary open-angle glaucoma. *JAMA Ophthalmol*. November 23, 2022. [Epub ahead of print].

Glaucoma Screening Criteria Used

Patients with at least one of the following were considered positive:

- an IOP >25mm Hg in one or both eyes
- suspected or evident glaucomatous optic disc, retinal nerve fiber defects or optic disc hemorrhages seen in fundus photographs
- exfoliation syndrome
- manifest glaucoma in one or more first-degree relatives

Dry AMD Linked to Dementia

A 1.22-fold increase of development was determined for both degeneration types, a large study finds. The authors argue for eye doctors to consider performing cognitive testing when warranted.

As age-related macular degeneration (AMD) shares several clinical and pathological features with Alzheimer’s disease (AD), one new study has sought to clarify epidemiological reports on the association between the two. Inconsistencies between AMD and subsequent dementia are present, thus warranting a new look.

The researchers conducted a meta-analysis of eight studies published between the years 2000 and 2021. Pooled hazard ratios of dementia or Alzheimer’s were estimated using a random-effects model. A total of 8,223,581 participants were included, with macular degeneration significantly associated with subsequent dementia. Even more specifically, the association was more prominent in cases of dry rather than wet AMD. Patients with AMD were found to have a 1.22-fold risk of dementia development and a 1.21-fold Alzheimer’s risk compared with patients without macular degeneration.

The researchers offer a theory as to why they found a stronger association with dry AMD rather than the wet form with either cognitive condition. Angiogenesis is involved in amyloid-beta peptide deposition, a clinical marker of AD. Since angiogenesis may be involved in neurodegenera-



Researchers found a stronger association with dry AMD and dementia and Alzheimer’s disease than with wet AMD with either condition.

tion, interventions that either directly or indirectly inhibit it may provide some beneficial effects against amyloid plaque development—a hallmark of AD—or other disease pathways. Increased levels of VEGF in cerebrospinal fluid and blood have been associated with AD’s clinical severity, and, subsequently, intravitreal injections of anti-VEGF agents for those with wet AMD would likely result in a lesser association.

As for the more general association between AMD and dementia, multiple hypotheses exist. One proposes that the amyloid-beta plaques found in AD, when seen in drusen, may lead to progressive AMD through means of oxidative stress, uncontrolled inflammation and imbalanced

angiogenesis. Similarly, both conditions display upregulation of inflammatory responses, displayed through high concentrations of complement factors in both patient subsets. AD patients display an elevated rate of a particular complement factor and an AMD-associated allele, potentially making this a risk factor for AMD patients to develop Alzheimer’s.

The authors focus on what clinicians can do for these high-risk patients. One option may be the Mini-Cog test, validated for patients with AMD in a prior study, to help aid early dementia or Alzheimer’s diagnosis. Following this logic, the authors propose in their paper for *AJO* that “routine cognitive assessment for high-risk patients may be warranted for the early recognition and management of dementia or AD.”

They also advocate for more action to disseminate news of this issue to the population. As they note in their paper, “given that researchers have identified certain retinal abnormalities as potential biomarkers for AD diagnosis and progression with advances in retinal imaging, clinicians should raise awareness of AD-related OCT biomarkers in patients with AMD.” ◀

Tsai HR, Lo RY, Liang KH, et al. Risk of subsequent dementia or Alzheimer’s disease among patients with age-related macular degeneration: A systematic review and meta-analysis. *Am J Ophthalmol*. 2022. [Epub ahead of print].

IN BRIEF

■ **Atrial Fibrillation Associated with Glaucoma.** This common cardiac arrhythmia was recently tied to increased likelihood of developing glaucoma in a study published in *Eye*. “Since cardiovascular disease and glaucoma are both chronic diseases, if a patient has both disorders, medical burden may be aggravated during the lifetime,” the study authors wrote in their paper.

The study cohort included nearly one million subjects with newly diagnosed glaucoma and atrial fibrillation (identified between 2003 and 2007) in the Korean National Health Insurance Service system, followed over a 12-year period. The control group ($n=43,352$) was matched for social and demographic factors.

The researchers reported a glaucoma development rate of 3.54% in the atrial fibrillation group and 2.96% in the control

group. This difference was significant, with atrial fibrillation increasing the risk of glaucoma development even after adjusting for age, sex, comorbidities, residence, household income and year of enrollment.

Multivariate analysis also showed that **patients with diabetes and chronic renal failure as well as patients 50 and older were at significantly higher risk for glaucoma development.**

The researchers wrote in their paper that “physicians may need to pay careful attention to patients with atrial fibrillation, especially those with comorbidities of diabetes and chronic renal failure.” They added that these patients should be referred to eyecare providers for glaucoma screening to avoid potential impairment of vision.

Cho H, Han J, Choi J, et al. Association between atrial fibrillation and the risk of glaucoma development: a 12-year nationwide cohort study. *Eye (Lond)*. November 12, 2022. [Epub ahead of print].

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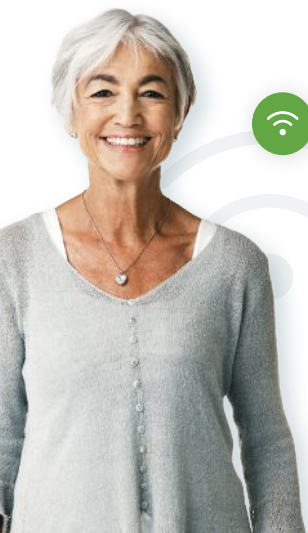
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Disc Hemorrhages Not Unusual in Pathologic Myopia

Noting a dearth of literature exploring the phenomenon of optic nerve damage manifesting in eyes with pathologic myopia, researchers recently studied the prevalence and characteristics of *papillary and peripapillary hemorrhages (PPHs)* in such patients. They coined this new term after observing that “disc hemorrhages are located not only on the optic disc and its margins but also within the peripapillary atrophic areas surrounding the optic disc. Therefore, we have renamed disc hemorrhages as papillary and peripapillary hemorrhages.”

The researchers examined 2,171 patients (3,774 eyes) with pathologic myopia. They reported a PPH prevalence of 4.05% (mean age: 66.8, mean axial length: 30.79mm). PPH recurred in 30.9% of eyes. A total of 90 eyes had single-site PPH, with the most common type and location being conus type (54.5%) and temporal

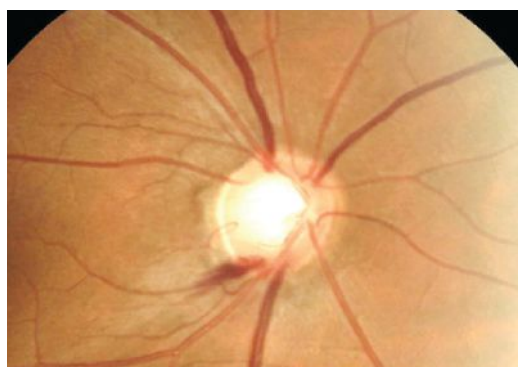


Photo: Sarah B. Klein, OD

Risk factors for papillary and peripapillary hemorrhage recurrence include axial elongation, mild myopic maculopathy and glaucoma.

side (73.3%). “Conus and periconus types of PPHs appear to be specific to pathologic myopia with a prevalence of approximately twice that of disc-related PPHs,” the researchers noted in their paper for the ARVO journal *Investigative Ophthalmology & Visual Science*.

According to regression analysis, patchy atrophy reduced the risk of recurrences more than diffuse atrophy,

while a longer axial length and potential glaucoma increased the risk. Optic nerve damage and mild myopic maculopathy were also risk factors for recurrence.

Fluorescein angiography and OCT revealed that PPH developed in the area of straightened retinal arterioles in 24 eyes, at or beside the peak of a ridge in 10 eyes and in an area of compressed retinal tissue in two eyes.

“The pathogenesis of PPHs in pathologic myopia is probably different from that in glaucomatous eyes, and it may be mainly related to the mechanical tension generated by pathologic myopia-associated lesions,” the researchers concluded. “These lesions can directly or indirectly damage the vessel walls. Such mechanical forces may play a role in pathologic myopic visual field defects.” ◀

Xiong J, Du R, Xie S, et al. Papillary and peripapillary hemorrhages in eyes with pathologic myopia. *Invest Ophthalmol Vis Sci*. 2022;63(12):28.

Myopia Spectacle Lenses Reduce Progression

A recent evaluation of myopia progression with highly aspherical lenslet (HAL) spectacles vs. conventional single-vision (SV) spectacles found that the former option was effective in slowing progression of the condition, with no rebound effect reported upon discontinuation.

HAL spectacles are comprised of a clear central zone with lenslets arranged beyond it in a contiguous ring format on the lens. There are 11 rings from the center to the periphery of the lens, with the lenslets meant to impose a volume of myopic defocus in front of the retina while correcting for the distance refractive error of the eye.

The prospective, double-blind, single-center, randomized, crossover trial—funded by Essilor, manufacturer of the lenses—included 119 children aged seven to 13 years old with a spherical

equivalent refractive error (SE) range of -0.75D to -4.75D who were randomized to wear either HAL or SV spectacles and after six months (stage one) crossed over to the other lens for another six months (stage two). At the end of stage 2, both groups wore HAL for a further six months. Group one was designated HSH (HAL-SV-HAL), and group two was SHH (SV-HAL-HAL).

Myopia progressed slower with HAL than SV during stages one and two (Δ SE stage one: -0.21D vs. -0.27D, stage two: -0.05D vs. -0.32D; Δ axial length (AL) stage one: 0.07mm vs. 0.14mm, stage two: 0.04mm vs. 0.17mm). Change in SE and AL with SV was not different between the HSH and SHH groups (Δ SE: -0.33D vs. -0.27D; Δ AL: 0.17mm vs. 0.13mm).

“In this crossover trial, inter-group and intra-group comparisons indicate

that HAL slows myopia,” the study authors wrote in their paper. “Children were compliant with lens wear, and data was not suggestive of rebound when switched from HAL to SV.” ◀

Sankaridurg P, Weng R, Tran H, et al. Spectacle lenses with highly aspherical lenslets for slowing myopia: a randomized, double-blind, cross-over clinical trial. *Am J Ophthalmol*. November 5, 2022. [Epub ahead of print].

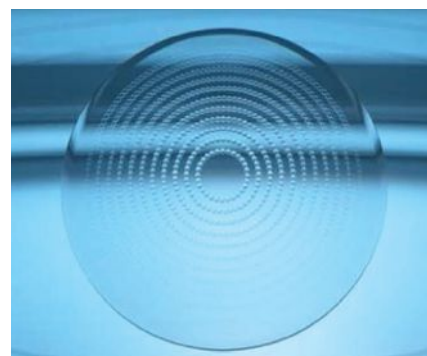


Photo: Essilor

Essilor's Stellest lens for myopia performed well in a recent study.

Pseudophakia, Male Sex Increase Risk of PVD Complications

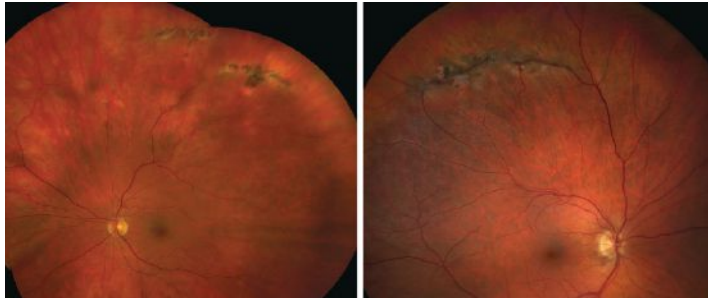
An extended follow-up should be applied to these groups, in addition to those with lattice/peripheral retinal degeneration or a history of retinal breaks or detachments.

With 25% of acute symptomatic posterior vitreous detachments (PVDs) complicated by vitreous hemorrhage, retinal break or retinal detachment at initial exam or within six months of diagnosis, PVD represents a major risk for retinal complications. Investigators examined the incidence of complications following PVD through an extended follow-up period and identified patient-specific factors associated with greater incidence of complication.

A total of 9,635 eyes with acute PVDs were included. Complications, such as vitreous hemorrhage, retinal break and retinal detachment, were evaluated at presentation and throughout a six-month follow-up period.

The rate of developing any complication was 25%, isolated vitreous hemorrhage was 13.1%, retinal break without detachment was 16% and retinal detachment was 4.2%. The majority of each complication was noted at presentation; however, 8% of isolated vitreous hemorrhages, 19.2% of retinal breaks without detachment and 25.8% of retinal detachments were first noted within the six-month follow-up period.

Males experienced a significantly higher rate of any complication com-



Nearly half of all eyes that developed lattice degeneration following PVD went on to develop a complication, study finds.

Photo: Jay M. Haynie, OD

pared with females (30% vs. 21.7%), as well as retinal breaks and retinal detachments at both presentation and within the six-month follow-up. Previous studies have found males to have greater axial lengths and age-dependent increases in vitreous base width, which the authors say may play a role in the predisposition for retinal breaks and detachments among men.

Pseudophakic patients experienced significantly higher rates of delayed retinal detachment compared with phakic eyes. Among eyes with lattice/peripheral retinal degeneration, 44.2% experienced a higher rate of any complication. “The presence of retinal break in the fellow eye and retinal detachment in the fellow eye was associated with a significantly increased rate of any complication at any time point, as well as each individual complication within the six-month follow-up period,” the authors explained in their

paper on the study, published in *Ophthalmology*.

“Prior studies have cited an approximately 10% risk of retinal detachment in the fellow eye in cases of unilateral retinal detachment,” the authors continued. “These findings are in line with those in this study, as we observed that both a history

of retinal break and retinal detachment in the fellow eye was associated with a higher risk of complication particularly within the extended six-month follow-up period.”

Among eyes with vitreous hemorrhage at presentation, 42% had a concurrent or delayed retinal break and 10.5% had concurrent or delayed retinal detachments.

“We recommend follow-up at the traditional four to six weeks with at least appropriate counseling on symptoms of progression to all patients and extended follow-up around three months in male eyes, pseudophakic eyes, eyes with lattice/peripheral retinal degeneration and eyes with history of retinal break or detachments in the fellow eye,” the researchers advised. ◀

Patel PR, Minkowski J, Dajani O, et al. Analysis of posterior vitreous detachment and development of complications using a large database of retina specialists. *Ophthalmol*. November 14, 2022. [Epub ahead of print].

IN BRIEF

Cataract: No Need to Recommend Change in Hypertensive Med Use. A recent study looking into the association between antihypertensive use clinically and cataract risk found that **this class of drugs was not associated with an increased prevalence of this ocular occurrence.** Previous research was inconsistent on the matter.

The case-controlled study evaluated the Korean National Health

Insurance Service-Health Screening Cohort database from 2002 to 2013. Cases were defined as patients prescribed antihypertensives who underwent cataract surgery between 2010 and 2013. Controls were patients prescribed antihypertensives with no history of cataract diagnosis or surgery between 2002 and 2013. Four controls were matched to each case, and adjusted odds ratios (ORs) and 95% confidence intervals were estimated for cataract risk using a conditional logistic regression model after adjustment.

The analysis included 12,166 cases and 48,664 controls. **The adjusted ORs for cataract were 1.18 with thiazide diuretics, 1.12 with beta-blockers, 0.94 with calcium channel blockers, 1.22 with angiotensin-converting enzyme (ACE) inhibitors and 0.97 with angiotensin II receptor blockers compared with non-use of each antihypertensive.**

“Given the benefits of treating hypertension, such as the reduction in further complications, we suggest there is no need to change current clinical practice for antihyperten-

sives,” the study authors wrote in their paper for *Ophthalmic Epidemiology*. “However, in a few sections of drug exposure, the risk of cataract increases with the duration of the use of some antihypertensives, therefore it should be taken into account that hypertension itself may increase the risk of cataracts rather than the use of antihypertensives.”

Yang HL, Byun SJ, Park S, et al. Antihypertensive use and the risk of cataract in patients with hypertension: a nationwide case-control study. *Ophthalmic Epidemiol*. November 11, 2022. [Epub ahead of print].

New AMD Prevalence Estimate: 20 Million Americans Affected

Despite AMD being a top cause of vision loss and blindness, nationwide estimates of its impact haven't been calculated in over a decade, and estimates of early-stage disease prevalence are inconsistent. One new study aimed to fill this gap, estimating prevalence of early- and late-stage AMD.

The researchers estimated that 18.3 million people aged 40 or older were living with early-stage AMD in 2019, for a prevalence rate within this age group of 11.6%. Late-stage AMD was estimated to have a prevalence of 0.9% or 1.5 million people over age 40.

The retrospective study used data from claims for fee-for-service beneficiaries and population-based studies. To determine between early- and late-stage AMD, the study defined early-stage AMD as retinal pigment epithelium abnormalities or the pres-

ence of drusen $\geq 125\mu\text{m}$ in diameter in either eye, while late-stage was defined as choroidal neovascularization and/or geographic atrophy in either eye.

Both stages' prevalence rates varied by geography as well as demographics. Early-stage AMD rates were lower in non-Hispanic Black individuals than

any other ethnic group. Late-stage AMD rates were also lower for non-Hispanic Black and Hispanic individuals than other ethnicities.

While the study's estimated prevalence of late-stage AMD at 0.9% was comparable to prior ones, its early-stage estimation was slightly higher than earlier projections. The authors identify multiple reasons for this, such as the use of 2019 population data that includes more people of older age. Previous estimation models for AMD prevalence may not have considered the aging population.

The authors say this updated data serves to provide more accurate, reflective numbers, and that these "state- and county-level AMD estimates may help guide public health practice."

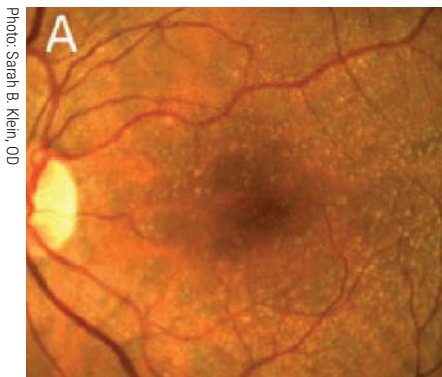


Photo: Sarah B. Klein, OD

Early-stage AMD seems to be increasing in prevalence, as 92.5% of all cases fall under this classification, a new study finds.

Rein DB, Wittenborn JS, Burke-Conte Z, et al. Prevalence of age-related macular degeneration in the US in 2019. *JAMA Ophthalmol.* November 3, 2022. [Epub ahead of print].

Look out for Deep ODD in Normotensive Glaucoma

In patients with normal-tension glaucoma (NTG), the potential presence of optic disc drusen (ODD) is often overlooked, especially in cases where it's buried in the deep layers of the optic nerve head. One study found that ODD presents in 0.2% to 0.3% of the general population, while autopsy studies found its prevalence to be 1.8% to 2% (indicating a greater occurrence of buried, nonvisible ODD). Recently, researchers observed that this percentage may be higher in normotensive glaucoma, detecting ODD in roughly 6% of NTG patients in their study, the majority of whom had nonvisible ODD and a low cup/disc (C/D) ratio.

The study included 98 patients with an NTG diagnosis from two glaucoma units (mean age: 71.5). Of 195 total eyes, ODD was detected in seven eyes (3.6%) of six patients (6.1%), including four females and two males.

"ODD were bilateral and ophthalmoscopically visible in one male, while unilateral and buried in the other five patients (four females and one male)," the researchers wrote in their study. "Four of these five patients presented with only a single relatively large ODD (245 μm to 452 μm in diameter)," which they noted was in the nasal section of the optic disc. The patient with bilateral, visible ODD also had deep ODD in the optic nerve head.



Photo: Joseph Sowka, OD

In this NTG patient cohort, the 6% with ODD had a lower C/D ratio and shallower cup.

Some of the visual field defects observed in eyes with ODD included constriction of the visual field, arcuate scotomas, nasal steps and paracentral defects. Eyes with ODD also had a lower C/D ratio (0.44 vs. 0.81) and a less prominent cup depth (236.6 μm vs. 437.8 μm) than those without ODD.

These findings demonstrate that the "prevalence of ODD in patients diagnosed with NTG is substantially higher than in the background population," the researchers concluded. They also noted that a low C/D ratio correlates with the presence of visible and/or nonvisible ODD. In light of this new data, the team "recommend[s] examining the deep layers of the optic nerve head in NTG patients with a C/D ratio below 0.5 to avoid misdiagnosing ODD as NTG." ◀

Sankaridurg P, Weng R, Tran H, et al. Spectacle lenses with highly aspherical lenslets for slowing myopia: a randomized, double-blind, cross-over clinical trial. *Am J Ophthalmol.* November 5, 2022. [Epub ahead of print].

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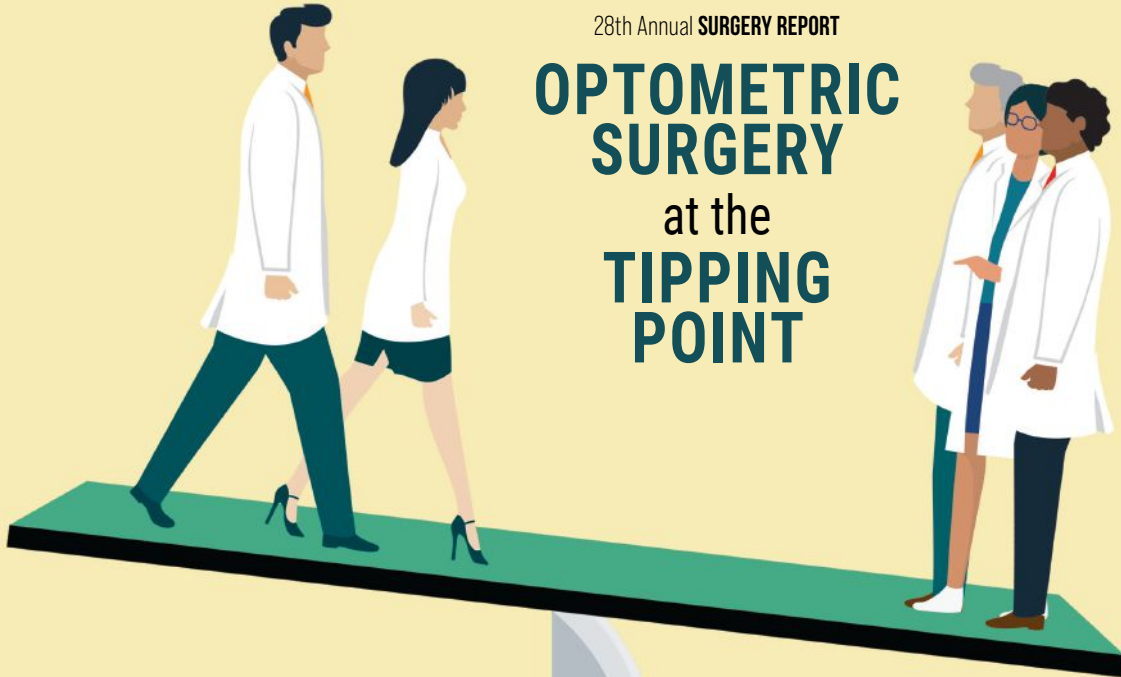


FEATURES

REVIEW OF OPTOMETRY • Vol. 159, No. 12 • DECEMBER 15, 2022

28th Annual **SURGERY REPORT**

OPTOMETRIC SURGERY at the TIPPING POINT



34 Gearing Up for Laser and Minor Surgery: Advice from Experts

When advanced procedures become part of your state's optometric scope of practice, use these tips to efficiently and confidently add them to your clinic.

By Catlin Nalley, Contributing Editor

42 Broaden Your Horizons to Include Lesion Removal

For many, our scope now allows us to provide more convenient and effective care. Here are the best tips I learned along the way as I expanded my practice to include this service.

By Corri Collins, OD

46 Take Charge of Cataract Care with Laser Capsulotomy

Alleviating PCO—the most common complication of cataract surgery—is well within optometry's skill set. Learn how to offer this valuable service to your patients.

By Alia Cappellani, OD, and Sophia Leung, OD

52 An OD's Guide to Using Lasers for Glaucoma

Capitalize on recent scope expansion laws by learning to perform SLT and LPI.

By Chris Wroten, OD, and Jeff Anatasio, OD

28 2022 Income: Work Smarter, Not Harder

With optometry seemingly stabilizing after a volatile period, ODs have been tasked with implementing sustainable strategies and solutions for a more profitable future.

By Catherine Manthorp, Senior Associate Editor



PROGRESSION IN GEOGRAPHIC ATROPHY IS RELENTLESS AND IRREVERSIBLE¹⁻⁴

While GA progression may appear to move slowly, it can affect your patients faster than you think^{1,4-6}

The consequences of Geographic Atrophy (GA) are too critical to be ignored⁷⁻⁹



IN A MEDIAN OF ONLY 2.5 YEARS, GA lesions encroached on the fovea according to a prospective AREDS study (N=3640)^{2*}



2 OUT OF 3 PATIENTS lost the ability to drive in a median time of <2 years according to a retrospective study (n=523)^{10†}

GA lesions can lead to visual impairment even before they reach the fovea^{1,5,6}



See the effect of GA progression on your patients

*Data sourced from the Age-related Eye Disease Study (AREDS) Report #26—a long-term, multicenter, prospective study examining progression of GA area in a cohort of 3640 patients with signs of early and more advanced forms of AMD.

†A retrospective cohort analysis (N=1901) of a multicenter electronic medical record database examining disease burden and progression in patients in the United Kingdom with bilateral GA secondary to AMD.

BCVA=best-corrected visual acuity.

References: 1. Boyer DS et al. *Retina*. 2017;37:819-835. 2. Lindblad AS et al, and AREDS Research Group. *Arch Ophthalmol*. 2009;127(9):1168-1174. 3. Holz FG et al. *Ophthalmology*. 2014;121(5):1079-1091. 4. Sunness JS et al. *Ophthalmology*. 2007;114(2):271-277. 5. Kimel M et al. *Invest Ophthalmol Vis Sci*. 2016;57(14):6298-6304. 6. Sadda SR et al. *Retina*. 2016;36(10):1806-1822. 7. Singh RP et al. *Am J Ophthalmic Clin Trials*. 2019;(1):1-6. doi:10.25259/ajoc-9-2018. 8. Sivaprasad S et al. *Ophthalmol Ther*. 2019;8(1):115-124. 9. Patel PJ et al. *Clin Ophthalmol*. 2020;14:15-28. 10. Chakravarthy U et al. *Ophthalmology*. 2018;125:842-849.

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DEPARTMENTS

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Not every OD needs surgical privileges. But that it's even possible shows just how ample the opportunities are to serve the public good.

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Laser Focused

Consider these advanced surgical procedures in your practice.

Paul M. Karpecki, OD

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Little Jack Horner

Calmly assess the possible underlying causes of this condition.

Paul C. Ajamian, OD



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Addition by Subtraction: Cutting the Cyl

Most of the time, small amounts don't equate to a change in prescription.

**Marc B. Taub, OD, MS,
and Pamela H. Schnell, OD**



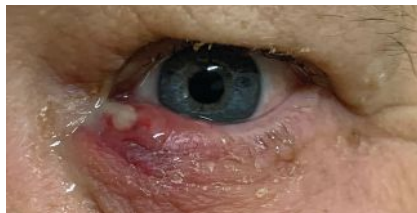
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One Last Time

Inflammation from dacryocystitis can be a minor nuisance.

By Joseph W. Sowka, OD



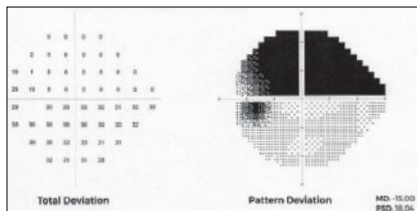
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Expect an Expert

A new patient needs a second opinion on her glaucoma diagnosis. Are you prepared to handle it?

James L. Fanelli, OD



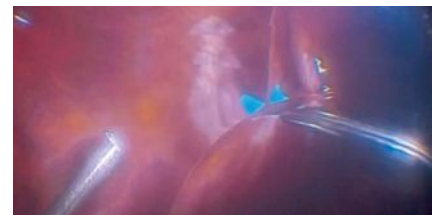
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SURGICAL MINUTE

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Foveoschisis requires surgical intervention. Here's what the MD will do to alleviate traction and protect the retina.

Michal Reygan Martin, OD



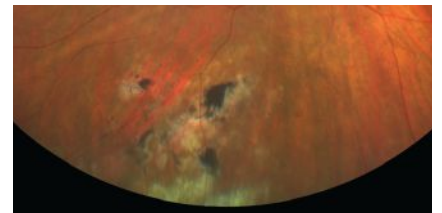
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DIAGNOSTIC QUIZ

In Deep Trouble?

Problems that arise beneath the RPE are often worrisome. Would you recommend immediate attention in this case?

Andrew S. Gurwood, OD



We Welcome Your Comments



Feedback from the community provides important insights about clinical practice. If you would like to share your thoughts on the topics discussed in this issue—or the wider field of optometry at large—write to:

editor@reviewofoptometry.com

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Get more out of your eyedrop bottles



Have you ever heard patients complain about their eyedrops? Maybe they ran out before the end of the month and had to wait for insurance to cover their next refill, or their eyes felt flooded with too much fluid? Have you noticed how much of the drop runs down your patients' faces when you're trying to dilate their eyes?

That's because eyedrops are too large for the eye to absorb. The Nanodropper Adaptor has solved this problem. Here's how it works!

What's the problem with eyedrops?

They're too big! **About five times too big, to be exact.** This means 80% of every eyedrop (and thus, every bottle) is wasted due to overflow and/or systemic absorption. This waste contributes to financial barriers to care, and clinical research has shown that oversized drops increase both local and systemic side effects!

How does Nanodropper help?

Pretty simple – by reducing the size of eyedrops to just what the eye can absorb! Smaller drops reduce waste and the cost of in-clinic and prescription eyedrops, and research has shown smaller drops minimize local and systemic side effects.

The Nanodropper is compatible with most of your commonly used in-office drops like Phenylephrine, Paremyd, OTC drops like Lumify, and expensive glaucoma medications like Rhopressa, Rocklatan, Vuity, and many more!



The Nanodropper Adaptor is quickly becoming the new standard of care, not only addressing patient concerns and challenges, but also a larger societal medical waste issue. It's not just a want to have, but a need to have.

-Robert Wooldridge, OD, of the Eye Foundation of Utah and advisor for Nanodropper



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The Nanodropper is the only FDA-listed, volume-reducing adaptor for eyedrop bottles designed to deliver precisely the amount of fluid the eye can absorb. Smaller drops reduce the waste and cost of in-clinic and Rx formulations while minimizing local and systemic side effects.

A WEALTH GROWTH OPPORTUNITY FOR OPTOMETRISTS

New Sight Capital is helping ODs achieve cashflow beyond the clinic



Walter O. Whitley, OD, MBA
Co-Founder, New Sight Capital



Russell Beach, OD
Co-Founder, New Sight Capital

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A WEALTH GROWTH OPPORTUNITY FOR OPTOMETRISTS

New Sight Capital is helping ODs achieve cashflow beyond the clinic

Nearly two years ago, Drs. Walt Whitley and Russ Beach co-founded New Sight Capital, a full-service investment firm specializing in apartment syndications. Now the two doctors are on a mission to help optometry practices grow their wealth and become less dependent on income from patients and insurance.

BIRTH OF AN IDEA

Before forming New Sight Capital, Walt and Russ had been actively investing in real estate for several years, starting with single-family rentals. Walt, after getting his feet wet in this space, later transitioned his investment into a 1031 exchange fund that continued to reap benefits. Russ' next steps after his early investing were to sell his optometry practice to a private equity firm and pour his energy into researching investment opportunities in the multifamily unit space.

Russ found that smaller multifamily units (8-20) had too much instability for his comfort, but larger units (100+)—which were essentially run as a business—offered stability, predictability, and the ability to draft other professionals to support the asset. The potential cashflow, tax benefits, and pathway to value growth were unique to the asset class and highly attractive to Russ.

Colleagues in optometry, Walt and Russ realized early they shared a passion for real estate investing. Over time, they began talking about the viability of starting their own investment firm. They realized that few of their professional peers had heard of apartment investing and so saw an opportunity to help optometrists while expanding their own investing horizons. In January 2021, they took the leap and formed New Sight Capital.

A GROWING ENTERPRISE

Today, nearly 1200 individuals have registered on the firm's website, 650 have gone through qualifying calls, and 30+ on average are getting qualified every week. Almost 300 individuals have invested in the firm's offerings, 90% of whom are optometrists.

Investments are in the form of apartment syndications, i.e., a collective pooling of capital from smaller investors to acquire an institutional-quality property, operate the property, return operational profit to investors, sell the asset once the group has forced appreciation, and return final profits to investors.

When Walt and Russ first started New Sight Capital, initial feedback was the core base of investors would be senior optometrists who had a great deal of liquidity after selling their practices. As it turned out, their investors are a healthy mix of older and younger optometrists who have a strong tendency toward financial wellness.

While every offering is unique in its potential return, average yearly cash distributions typically range between 8 and 10%. Total returns can be 100 to 110% over a six-year period when factoring in yearly distributions and profit from the sale of the asset, which equates to around a 16 to 18% average annual rate of return. This doesn't account for the tax benefit of property depreciation.

BENEFITS TO THE OPTOMETRIST

Several advantages of this type of investing for busy optometrists are, first, the opportunity is completely passive. New Sight Capital's asset and property managers, and legal team do all of the work. Second, investors are given first position in the payout of operational cashflow and profit from the

INVESTOR

**#1: Dan Jones,
OD, Owner of
OBX OPTIX
Optometric,
PLLC**



My practice in the Outer Banks of North Carolina has 1 OD and 7 staff members. We are 50/50 in medical and family eyecare, and co-manage many of our patients with their doctors and specialists.

A few years ago, the instability of equity markets had me looking for less volatile investing opportunities. I purchased a small rental property but found it difficult to acquire quality long-term rentals. When several trusted colleagues introduced me to New Sight Capital, it was perfect timing.

New Sight did the research to find prime apartment markets nationwide, and contribution amounts were flexible so I could invest at my comfort level. Diversifying in different markets minimized my risk further.

I was especially attracted by the idea of ROI in the form of distributions and property appreciation. The initial accelerated depreciation would create an excellent passive tax benefit as the syndication paid out over time. With standard housing prices so high in many regions, the demand for quality apartments would just continue to rise. At the same time, I knew from my research that many markets were short on solid long-term rentals, so apartment syndication was a perfect fit for my investing needs.

New Sight Capital has given me a great deal of confidence in the products in which I am investing. This is especially important for me as I approach retirement in 5 to 10 years. 💰



sale of the assets. Lastly, by way of a Schedule K-1 tax return, investors can leverage depreciation to offset tax burdens associated with cash distributions.

New Sight Capital offers interested ODs who register on the firm's website an informative 20-minute video presentation that lays out the fundamentals of this kind of investing. The co-founders say that getting educated is the first step to becoming an investor.

LONG TERM GOALS & RISK MANAGEMENT

When Walt and Russ started New Sight Capital, they spent considerable time creating Core Objectives. The first, capital preservation, ensures co-founders execute due diligence, underwriting, and asset management in a way that preserves the invested capital of those who entrust their money to them. The second is to retain the passive investment strategy. Walt and Russ aim to provide investors stable cashflow with the long-term goal of strategically forcing appreciation of properties and selling them in a way that grows their customers' capital.

When it comes to risk management, Walt and Russ explain that investors are considered limited partners and covered by a liability shield minimizing their personal risk. Such protection means investors are not guaranteeing debt obligations associated with the

INVESTOR

#2: Franziska Schulze, OD, Owner of a Practice in Northern CA



My small, rural practice in Northern California of 1 OD and 3 part-time employees (an ophthalmologist comes once a month) has office hours 3 days a week and nets about \$200K/year.

We approached New Sight Capital at the beginning of 2022, new to real estate investing. Our goal was to create some passive cashflow and get a good, fairly safe return on money we had saved up.

Seven months after our initial investment, we received our first distribution (2%). Though it's early in the process to make projections, we are hoping to double our investment after 6 years.

As far as risks are concerned, we invested money we could "spare" and survive without for 6 years, and invested with the mindset that we may not make much or any money.

The current economic environment, in part created by the COVID pandemic, has highlighted the importance of stable investments that are less impacted by market changes. Apartment syndication made sense to us and appears to be a solid investment particularly if there's a downturn in the economy. 💰

New Sight Capital Properties

Here are a few current properties in the company's portfolio.



304-unit complex in Mobile, AL



216-unit complex in Bradenton, FL



131-unit complex in Scottsdale, AZ



A WEALTH GROWTH OPPORTUNITY FOR OPTOMETRISTS

New Sight Capital is helping ODs achieve cashflow beyond the clinic

properties or exposed to liabilities arising from the properties' operations.

In addition, New Sight Capital team members expend considerable effort in doing their due diligence of prospective real estate opportunities. They thoroughly vet properties, markets, tenant bases, and management support before bringing investment offerings. And they conservatively underwrite offerings, accounting for worst-case scenarios when projecting returns. Walt, Russ, and Caleb Bryan, director of operations & investor relations, are often personally invested in the offerings they present and have an interest in protecting investments.

POST-COVID LESSONS

From a practical standpoint, Walt and Russ say the pandemic taught optometrists in private practice to be prepared for the unexpected and not to rely on the status quo for income streams. As the residual effects of the pandemic continue to strain some practices in the form of lost revenue, this has underscored the need to rely less on patient visits and insurance for cashflow and wealth growth.

The New Sight Capital co-founders say apartment syndications are even more appropriate and relevant today. "In the post-COVID world, stocks have become increasingly volatile," Russ says. "However, we find large multifamily assets to be more stable because of supply and demand. The markets we target have limited supply and high renter demand. This strategy helps ensure increased rents, profitability, cashflow, and valuations for investors."

The pandemic taught optometrists in private practice to be prepared for the unexpected and not to rely on the status quo for income streams.

A UNIQUE OFFERING

New Sight Capital differentiates itself from other investment firms in several ways. For one thing, the firm, run by optometrists catering to other optometrists, is uniquely poised to understand the challenges OD investors face. "We don't just seek to make the numbers work," Walt says. "We spend a great deal of effort, time, and money to ensure we've brought offerings that incorporate headwinds and risks."

As well, New Sight Capital always seeks to leave properties in better condition than when they were acquired. Russ says, "We have shown we can deliver solid, risk-adjusted returns for our investors and still give the tenants of our properties a high quality of living. People matter to us. We feel this way about investors, and we aim, through our execution of asset management, to give better properties to our tenants as well."

Learn more about New Sight Capital at <https://newsight-capital.com/>. ●

INVESTOR

#3: Jeffrey C. Michaels, OD, Owner of a Practice in Glen Allen, VA



I am in a third-generation primary care practice with 5 ODs and 25 staff members in Glen Allen, VA, that also offers a dry eye spa, myopia management, and scleral lenses.

I became an inaugural investor with New Sight Capital for two reasons: I wanted to diversify beyond my traditional investments; and I knew Walt and Russ for more than 20 years in the optometry world and had complete trust in them. At the time, I was fairly new to real estate investing.

Less than a year into the process, some of my investments are already returning profits. However, I am looking out 5 years and not focused on what is happening this quarter or this early in the process. Also, I'm not using practice funds to invest—this is a personal decision, and I'm very happy with the early evolution.

With regard to risk management, every form of investing holds risks. If you ask anyone with a 401k how their investments have been doing for the past 2 quarters, they'll say they are down for sure but that they are investing for the long haul. Apartment syndication is a 5-year plan for me. And I could not speak more highly of Walt and Russ, who have invested their money alongside me.

My advice to prospective investors is to get to know Walt and Russ. They go to a lot of optometry meetings, and I recommend taking a few minutes to learn about them as people, and the heart and soul of their values and beliefs. I think ODs will find Russ and Walt are just like the rest of us, but they have found a unique avenue to help us all grow. \$

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BY JACK PERSICO
EDITOR-IN-CHIEF**OUTLOOK**

Be All That You Can Be

Not every OD needs surgical privileges. But that it's even possible shows just how ample the opportunities are to serve the public good.

Back in 1980, the US Army started a new recruitment campaign centered around the idea of military service bringing out the best in a person. A series of commercials showed enthusiastic young servicemen jumping out of planes, manning heavy artillery and generally looking ready for anything. Over a video montage, a narrator said with obvious pride, “We do more before 9am than most people do all day.” Yes, this was somehow considered a selling point. Anyway, the TV spots always ended with the tag line, “Be all that you can be.”

That could also easily be the refrain of seemingly everything we publish. This magazine has been encouraging optometrists to reach their full potential literally since before the profession was even called optometry. What’s especially interesting is that the horizon has only ever gotten wider for how optometrists can envision themselves—from optical to diagnostic to medical and now to surgical professionals.

As our issue theme highlights this month, optometric surgery is moving out of the fringes and into the mainstream. The perception of optometric surgery is finally shedding its origins as a trade-off that patients in rural areas have to make for convenience’s sake. Nope, it’s just plain old optometry now, or will be soon.

And, as always, we’ll be working to evolve this publication along with you. In 2022 we devoted a good deal of coverage to the push for expanded scope of practice: reporting the news, advocating for involvement in the lobbying effort and offering plenty of “how to” guidance on the new clinical responsibilities at stake.

Come next month, we’ll formally put a marker down on that bet with a new column on surgical procedures to be written and edited by Nate Lighthizer, OD, one of the leading lights of optometry’s move to embrace these emerging opportunities. Nate, by the way, is definitely one of those people who do more before 9am than most people do all day. We’re excited to have him share his experience and insights in these pages.

But there’s an important caveat. Just because you *can* jump out of an airplane doesn’t mean you *have* to.

While there are certainly some in-office procedures that feel suited to broad swathes of the profession (intralesional injection, for instance), it would be overzealous to expect every OD in America to run out and buy a YAG laser. Some may not have the patient base. Some may have prominent ophthalmologists in their midst and want to avoid poking the bear. Some may simply not be interested in the work. And all that is OK. Optometry doesn’t have formal subspecialties, but the profession’s clinical footprint is now so large that it’s becoming impractical to expect every OD to be up to every task.

So, be all *you* can be—choose what works for you, excel at it and push beyond your comfort zone—while also celebrating the many other ways your colleagues answer the call to service.

A quick farewell to Joseph Sowka, OD, who this month ends his 18-year term as a *Review* columnist. In 2023, he’s handing over *Therapeutic Review* to Jessica Steen, OD, a rising star and ace clinician. Thanks for everything, Joe. And welcome, Jessica! ■

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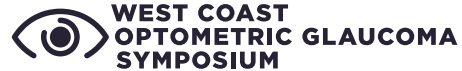
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BY PAUL M. KARPECKI, OD
CHIEF CLINICAL EDITOR

THROUGH MY EYES

Laser Focused

Consider these advanced surgical procedures in your practice.

It behooves us to both know where our patients' needs lie and provide the comprehensive care that is within our scope of practice. Performing advanced laser procedures can significantly help not only patients but the entire healthcare system. I'll detail these and other innovative clinical options you may not have considered. Be sure to consult with your state board on which surgeries would be within your scope of practice.

Typical Advanced Procedures

Ten states allow for laser procedures such as selective laser trabeculoplasty (SLT), laser peripheral iridotomy (LPI) and YAG laser capsulotomy. Surgical privileges in these states include injections and removing non-cancerous lesions, lumps and bumps.

SLT can lower IOP by 25% to 30% and is relatively non-invasive, quick and easy to perform, highly efficient, repeatable and cost-effective. LPI can be administered in narrow-angle glaucoma patients.

Sustained-release Implant

Another glaucoma option is the bimatoprost sustained-release implant known as Durysta (Allergan), which can often be performed at the slit lamp. Insert a speculum and prep the ocular surface with anesthetic, antibiotic or aseptic drops. The special-designed inserter is a combination of a 28-gauge needle with a push-button release mechanism, much like that of a punctal plug. The inserter is placed just inside the limbus around

4:00 and inserted at least two bevel lengths aiming toward the inferior angle—away from the iris and pupil. It's best to hold the inserter with two fingers behind and two in front (with one of them on the press release button). Once released, gravity takes the pellet to the lower anterior chamber. The needle should then be removed very slowly. The pellet remains in the inferior angle for two to four months, although studies show that 28% to 40% of patients sustained lower IOP one to two years after implantation.¹

“Performing advanced laser procedures can significantly help not only patients but the entire healthcare system.”

Corneal Crosslinking (CXL)

These systems are typically too expensive for most optometric practices, even though the vast majority of keratoconus patients are followed and managed by an optometrist. A company called TecLens is developing a CXL technology that involves a scleral lens with a built-in transducer that can be placed on a patient's eye with riboflavin in the bowl. The UV light is applied, and after 15 to 30 minutes, CXL is complete.

Another technology not far from potential approval is the EpiSmart system (CXL Ophthalmics), which has shown promise in being able to perform an epithelium-on CXL and would simplify the procedure.

Light Delivery Service

One of the most innovative technologies I've experienced, which achieves the highest percentage of 20/20 or better post-cataract surgery outcomes of any cataract implant, is the Light Adjustable Lens (RxSight). With this technology, the cataract surgeon obtains a basic measurement and selects an IOL. If the post-cataract refraction needs tweaking or the patient prefers monovision, for example, the lens can be adjusted with a light delivery device (LDD) in one to two minutes. The majority of postoperative measurements to determine the ideal correction for the LDD are taken by optometrists, which is not a big surprise; however, the LDD procedures are also performed by a sizable percentage of optometrists. LDD adjustments are great procedures that can help lessen the burden on cataract surgeons.

Your Surgical Future

Ophthalmic surgery performed by optometrists serves a key role in the healthcare system, from patient access in rural areas and communities with few ophthalmologists to slowing the backlog of patients who need cataract and other advanced surgeries. As in the case of the Light Adjustable Lens, for every cataract surgery there are at least three postoperative visits and often two to three LDD procedures, which back up the system.

Optometrists performing these procedures can greatly help their patients, the ocular surface and the healthcare system, just to name a few. It becomes incumbent on optometry, in states where they are licensed to perform these surgeries, to do so. ■

1. Craven ER, Walters T, Christie WC, et al. 24-month phase I/II clinical trial of bimatoprost sustained-release implant (bimatoprost SR) in glaucoma patients. *Drugs*. 2020;80(2):167-79.

About
Dr. Karpecki

Dr. Karpecki is the director of Cornea and External Disease for Kentucky Eye Institute, associate professor at KYCO and medical director for the Dry Eye Institutes of Kentucky and Indiana. He is the Chief Clinical Editor for Review of Optometry and chair of the New Technologies & Treatments conferences. A fixture in optometric clinical education, he consults for a wide array of ophthalmic clients, including ones discussed in this article. Dr. Karpecki's full disclosure list can be found in the online version of this article at www.reviewofoptometry.com.

Study Highlights Role of Emotional Readiness for Cataract Surgery

By Amy Hellem, MLA; Sara LaBelle, PhD; Cynthia Matossian MD, FACS; and Paul Karpecki, OD, FAAO

From the patient's perspective, learning about cataracts and preparing for and undergoing surgery is an emotional journey as much as it is a physical one. With that in mind, it's vital that the cataract care team offer support that promotes comprehensive wellbeing.

As new research indicates, helping patients participate in their care early in the cataract journey can help ensure that they receive timely surgery under improved conditions. Specifically, research shows that when patients are afraid of surgery, they avoid having cataract surgery for as long as possible, enduring poor acuity that could lead to other potential dangers, including falls. However, this same research shows that most patients are willing to engage in a daily ocular surface hygiene routine in the weeks leading up to surgery. This activity gives patients agency as they emotionally adjust to their need for surgery. In addition, by minimizing apprehension, patients may be better prepared to make important decisions about premium surgical options, such as presbyopia and astigmatism correction.

STUDY DETAILS

This noninterventional, cross-sectional investigation of 278 U.S. adults age 65 and older sought to identify cataract surgery candidates' knowledge, beliefs, desires and emotions as well as their behavioral intent to adhere to their doctors' pre-surgical recommendations.¹ In this mixed methods study, two key variables of interest—fear and uncertainty—were measured both quantitatively and qualitatively, providing specific insights into how patients feel so that researchers could extrapolate best practices for mitigating these undesirable emotions.

Specifically, the report, which was recently published in *Clinical Ophthalmology* found that fear is the predominant emotion in one out of every three study participants. Importantly, there is also a notable correlation ($r = .44$) between fear and intention to delay having surgery for as long as possible. This is potentially troublesome when an ECP tells a patient that they are developing cataracts and that patient silently worries and reacts by putting off future visits until their vision becomes unmanageable. The authors strongly recommend prescribing a pre-surgical prep-kit as a way to combat fear and uncertainty while giving the patient greater agency and autonomy, in effect preparing them both emotionally and physically at a time when they might otherwise avoid proper care and delay surgery.

PATIENT PREFERENCE

There's a common misconception that patients are in a big hurry to have cataract surgery, but this research modifies such reasoning. Specifically, patients who have yet to present for their consult are more likely to be avoiding care. Only 20% of participants in the study said they wanted to have cataract surgery at all and only 8% said they wanted to have cataract surgery as soon as possible.

A second misconception addressed in the study is that cataract surgery candidates are unwilling to participate in a pre-operative prep routine. However, 87% of participants in the study say they would use a pre-surgical prep kit if their doctor gave them one and 83% said they would use a pre-surgical prep kit if they were asked to buy one.

87% of participants in the study say they would use a pre-surgical prep kit if their doctor gave them one.

83% said they would use a pre-surgical prep kit if they were asked to buy one.

IMPLICATIONS

The benefits of a healthy ocular surface prior to cataract surgery are well established, but this is the first study to inquire about the potential emotional benefits of pre-surgical prep. To that end, the authors are initiating future studies to investigate the clinical and emotional outcomes of prep, as well as the impact that initiating a prep routine may have on patient apprehension and intraocular lens selection. Participants will use a moist heat eye compress, lid wipes, and hypochlorous acid solution in the weeks leading up to surgery. As each of these have been shown to improve ocular surface health and limit bacteria, surgeons can offer these conveniently now. Bruder Healthcare makes this easy with its all-in-one prep package that you can recommend to patients in advance of their surgical consultation appointment.



LEARN MORE

¹Clin Ophthalmol. 2022;16:1003-1008. <https://doi.org/10.2147/OPTH.S356895>
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Remedy This

Every family has their own “tried-and-true” recipe. Does it actually work? Definitely not, but let’s avoid bursting any bubbles.

Growing up, I’m sure you can think of a few times when dear old mom resorted to the family’s good ole home remedy to solve an issue that may or may not have required more extensive care.

My family called theirs “The Old Family Recipe.” If you sprained an ankle, pulled a muscle or suffered an orthopedic injury, you would do the following:

1. Cut a brown paper grocery bag into 2in.-wide strips.
2. Soak the paper strips in white vinegar.
3. Wrap the strips around the injured area.
4. Wrap again with a hand towel, and wet the towel with more white vinegar.
5. Wrap the whole area with a dry towel or trash bag.
6. Heal overnight.

Bizarre, right? But you know what? It actually nearly always worked every time.

Home remedies are not always a dumb idea, possibly due in part to the placebo effect. Who cares if they actually solve the problem, right?

When researchers conduct double-blind studies on a new blood pressure med, a number of participants always see some type of improvement in their blood pressure with the fake pills. Maybe we need to spend some time wondering why.

Through the years I have had many, many patients tell me about how they solved myriad eye problems with

“**Bizarre, right? But you know what? It actually nearly always worked every time. Home remedies are not always a dumb idea, possibly due in part to the placebo effect. Who cares if they actually solve the problem, right?**”

their simple home remedies. Some even make sense. Take a look:

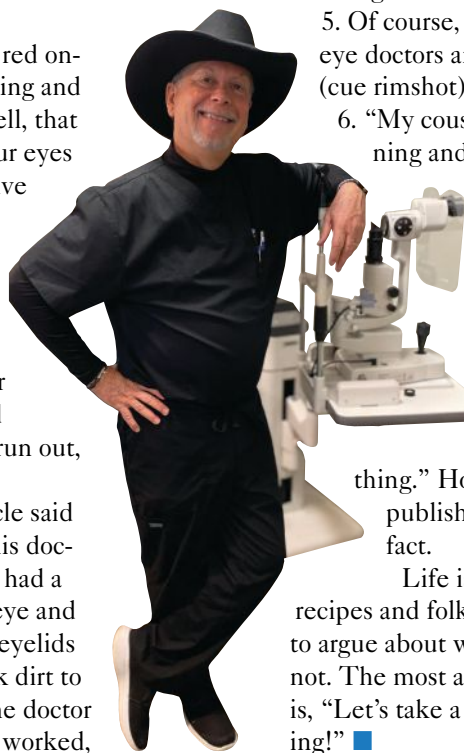
Dry eye?

1. Sniff a cut red onion every morning and every night. Well, that would rinse your eyes out with reflexive tears, right?

2. Suck on a river rock. Okay, what?

3. Pluck one eyelash per day. This could help until you run out, I guess.

My great uncle said that one time his doctor told him he had a “pupil” in his eye and to massage his eyelids with good black dirt to get rid of it. The doctor told him it had worked,



and the pupil was gone. Does that sound like something insurance would cover?

Blurred vision?

1. Surely you have all heard of palming, right? If you palm hard enough, it works like CRT contact lenses.

2. Heard of “second sight”? Some old guy at church all of a sudden didn’t need his reading glasses to read the Bible any more. Myopic shift from his nuclear sclerosis perhaps? Hey, he was happy, so who cares?

3. “If you never wear glasses, you will never need them.” A 4.00D myope told me that just before he drove his family home from church. I haven’t heard anything since, so I guess they made it. Who needs to see those pesky road signs anyway?

4. “Suck on licorice for better vision.” Me? I’d rather be blind, unless drinking Ouzo has the same effect.

5. Of course, carrots! Who needs eye doctors anyway? Not rabbits (cue rimshot).

6. “My cousin got struck by lightning and never had to wear glasses again.” The tombstone said, “Finally doesn’t need glasses.”

7. “Since I started drinking beet juice, I only have to wear my glasses when I want to see something.” How fortunate! Let’s publish that world-altering fact.

Life is full of old family recipes and folk remedies. Best not to argue about whether they work or not. The most appropriate response is, “Let’s take a look at your imaging!” ■

About Dr. Vickers

Dr. Vickers received his optometry degree from the Pennsylvania College of Optometry in 1979 and was clinical director at Vision Associates in St. Albans, WV, for 36 years. He is now in private practice in Dallas, where he continues to practice full-scope optometry. He has no financial interests to disclose.

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EDITED BY PAUL C. AJAMIAN, OD

CLINICAL QUANDARIES

Little Jack Horner

Calmly assess the possible underlying causes of this condition.

Q I have a 39-year-old patient who went in for a fractured ulna repair under general anesthesia with a nerve block. When he woke up from surgery, he had a unilateral ptosis and miosis on the same side as the surgical arm. Both findings resolved completely within three to four days. What is going on?

A “Although seemingly innocent, ptosis and miosis are classic signs of Horner’s syndrome,” says Kristen Thelen, OD, of Emory Eye Center in Atlanta. “These findings can be indicators of more insidious underlying conditions.”

When a ptosis is present with miosis, it is a sign of a disruption within the sympathetic nervous system (SNS). In this case, it appeared to be an inconsequential side effect of the anesthesia. It is a surprisingly common complication with certain types of nerve blocks.

However, according to Dr. Thelen, knowing the pathway of the SNS is crucial for identifying other underlying causes of Horner’s syndrome and gauging the severity of your patient’s situation. Considering the associated nerve block and lack of additional central nervous system involvement, this patient likely had a disruption within the third-order neuron pathway.

The third-order neurons are located near the stellate ganglion and great vessels of the neck. Simply because of proximity, the third-order neurons are vulnerable to the effects of anesthesia. When blocks are administered in the neck area, the anesthesia can temporarily affect

the adjacent third-order neurons. It’s likely that a supraclavicular approach was used to deliver the nerve block for the patient’s arm surgery.



Temporary Horner’s are not uncommon with anesthesia, and they are usually no cause for alarm.

—Kristen Thelen, OD

First-order and second-order neuron involvements often occur from brain or spinal cord damage but was thankfully not the case in this patient. Had there been any concern for first- or second-order neuron involvement, imaging of the entire three-neuron sympathetic pathway would have been necessary.

Anatomy and Differentials

The etiology of Horner’s syndrome can be classified by the anatomical

location of sympathetic disruption. Here are some examples of conditions that can result in Horner’s syndrome based on first-, second- or third-order neuron disruption:

First-order neuron: hypothalamus to ciliospinal center of Budge.

- Multiple sclerosis
- Cerebral vascular accident (CVA)
- Spinal trauma above the T2 to T3 level
- Spinal cord tumor

Second-order neuron: T1 level of the spinal cord to C3 to C4.

- Tumor involving apex of the lung
- Lesions of the subclavian artery (an aneurysm)
- A dental abscess involving the mandibular region

Third-order neuron: external carotid to trigeminal nerve.

- Carotid cavernous fistula
- Internal carotid artery dissection or an aneurysm
- Cluster headaches or migraines
- Herpes zoster infection
- Temporal arteritis
- Local anesthesia

Testing

Cocaine and hydroxyamphetamine are the standard agents used in diagnostic testing for patients with Horner’s syndrome. Due to cost and



Horner’s syndrome after nerve block.

About Dr. Ajamian

Dr. Ajamian is board certified by the American Board of Optometry and serves as Center Director of Omni Eye Services of Atlanta. He is vice president of the Georgia State Board of Optometry and general CE chairman of SECO International. He has no financial interests to disclose.

security concerns, these drugs are not widely available and are not realistic for most clinic settings. Apraclonidine is widely available and a great diagnostic tool for confirming your diagnosis, but it will not provide the location of the SNS lesion. When topically applied in Horner's syndrome, apraclonidine will cause dilation of the affected pupil and no change to the normal pupil.

"Once your diagnosis of Horner's is confirmed, and you've taken a detailed history from your patient, you can make a better decision on imaging timeline," Dr. Thelen says. "In the rare case of acute, painful Horner's (*i.e.*, neck pain), this should be considered a neurological emergency because of the risk for dissection of the internal carotid artery."

Prognosis

Based on the lack of additional neuro symptoms and speedy resolution of this patient's Horner's syndrome, Dr. Thelen suggests that they likely had



An almost complete resolution after four days.

a heavy dose of anesthesia administered during their nerve block. This could have easily caused a temporary and isolated disruption in the sympathetic cervical chain.

A study published on the National Institutes of Health's website reports the incidence of a temporary Horner's in 100% of the patients with an interscalene block of the brachial plexus.¹ An interscalene block is a type of supraclavicular block often used in orthopedic medicine. "Temporary Horner's cases are not uncommon with anesthesia, and they are usually no cause for alarm," she notes.

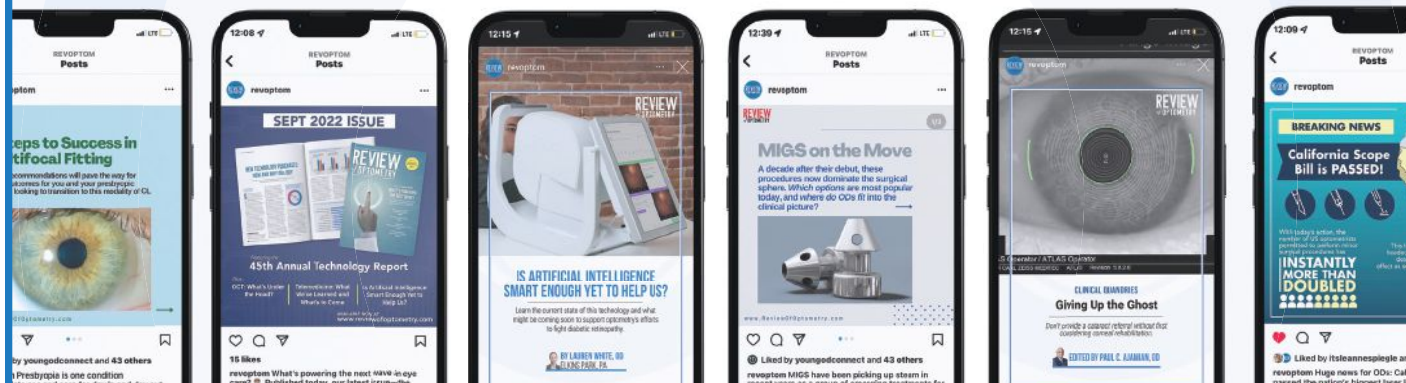
Irrespective of the etiology, some patients with Horner's have permanent sequelae. If symptoms are bothersome enough to cause quality-of-life or cosmetic concerns, there are pharmacological and surgical treatment options. The ptosis can be treated medically with Upneeq 0.1% (oxymetazoline hydrochloride ophthalmic solution, RVL Pharmaceuticals) or surgically by an ophthalmic specialist. ■

1. Walid T, Mondher BA, Mohamed Anis L, Mustapha F. A case of Horner's syndrome following ultrasound-guided infraclavicular brachial plexus block. Case Rep Anesthesiol. 2012;2012:125346.

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BY MARC B. TAUB, OD, MS, AND PAMELA H. SCHNELL, OD

FOCUS ON REFRACTION

Addition by Subtraction: Cutting the Cyl

Most of the time, small amounts don't equate to a change in prescription.

One of the most difficult things to teach optometry students is how to choose a final spectacle prescription. They learn quickly how to perform a manifest refraction, how to do a binocular balance and how to determine best acuity through the proposed lenses; this is all fairly easy to teach. What is harder to convey, though, is how to pick the best Rx for a patient—which lenses will that patient actually be able to use comfortably and efficiently to fulfill their visual goals? It's not always the numbers that are shown through our testing.

A prime example of this that we have noticed over our 20+ years in optometric education is in helping students learn what to do with small amounts of cylinder. It is easy to define refractive conditions by a simple mathematical combination of the refractive power of the cornea, lens and length of the globe. As these values are relatively constant for a given individual, though, how do we account for the small fluctuations in refractive status that we see as we go through our standard testing? What does it mean when a patient shows something different following dilation or cycloplegia? There are underlying functional phenomena that can account for this, and it is important

that we test for and pay attention to these when prescribing.

Discussion

I (Dr. Schnell) am fascinated by history, particularly by the history of our own profession, so I tend to read papers and books by some of the foundational minds in optometry. If we dig back into the work of several well-known optometrists—A. M. Skeffington and Elliott Forrest are two whose work continues to inspire me—we can find explanations of what is happening when we see transient astigmatism in our patients.

According to Dr. Forrest, functional astigmatism is indicated when patients move their eyes more in a given direction than they do their head.¹ Thus, small amounts of with-the-rule astigmatism are seen in patients who tend to move their eyes side-to-side more, and low against-the-rule cylinders appear in patients whose eye movement is greater than their head movement in the vertical direction.

This has a direct connection to accommodation. Think of the student who sits at a desk or the office worker who stares at a computer screen all day. The primary direction of eye movement in these scenarios is likely to include looking up and down from

the board (for the student) or looking up and down from the computer (for the office worker). Both are vertical motions that incorporate near-to-far movement requiring accommodation.

In addition to this phenomenon, cognitive demand has been shown to influence accommodation, so much so that increased difficulty of near work—in addition to the working distance itself—can increase a patient's accommodative effort.^{2,3} In several more recent studies, small changes in against-the-rule astigmatism have been shown to occur with changing accommodation.^{4,8} It has been shown that children who begin school with low amounts of against-the-rule astigmatism tend to show myopia in later years; Dr. Martin Birnbaum put it like this: "The organism grows along the line of stress to reduce stress."^{2,9} Given the current increase in myopia that we are seeing across the board, it behooves us to do whatever we can to preclude the onset of preventable disease from occurring.

So, how does this relate to prescribing? My general rule for low amounts of cylinder that appear in the refraction is this: the patient has to prove to me that it's real (that is, constant) and that they really need it. I can't recall the last time I actually prescribed -0.25 cyl; most -0.50 and many -0.75 against-the-rule cyls can be eliminated with no decrease in the patient's acuity or function. Let me give a few examples:

Patient 1. An 18-year-old female showed retinoscopic findings of -2.50 DS OD and -1.75 DS OS. Manifest refraction showed -2.50 -0.50x110 OD and -2.50 -0.25x090 OS. Her best-corrected acuity was 20/20 with the retinoscopy, however. We opted to cut the cyl and go with a final Rx

About Drs.
Taub and Schnell

Dr. Taub is a professor, chief of the Vision Therapy and Rehabilitation service and co-supervisor of the Vision Therapy and Pediatrics residency at Southern College of Optometry (SCO) in Memphis. He specializes in vision therapy, pediatrics and brain injury. **Dr. Schnell** is an associate professor at SCO and teaches courses on ocular motility and vision therapy. She works in the pediatric and vision therapy clinics and is co-supervisor of the Vision Therapy and Pediatrics residency. Her clinical interests include infant and toddler eye care, vision therapy, visual development and the treatment and management of special populations. They have no financial interests to disclose.



Simulation of significant cylindrical blur.

of -2.00 DS OU, through which she was still able to achieve 20/20 OD and OS. Accommodative findings in this case were mildly reduced with the manifest, but they were normal with the final Rx. There was no reason to include the additional cylindrical portion here.

Patient 2. A 16-year-old patient came in with unaided visual acuities of 20/30- OD and OS at distance and 20/200 OD and OS at 40cm. Her near point of convergence was quite reduced, to 11cm OD and 15cm OS, and her accommodative amplitudes were also low at 8.00D OD and OS. Retinoscopy revealed +0.50-0.50x090 OD and OS, but she was still able to achieve 20/20 in each eye with +0.50 spheres at both distance and near. Clearly, the against-the-rule cylinder was not necessary in her final Rx. She was asked to return for further binocular assessment.

Patient 3. A 16-year-old male presented with normal entering acuities (20/20 OD and OS at distance and 20/15 OD and OS at near) but reduced stereo of 100 sec, accommodative amplitude of only 6.00D OD and

OS and low positive relative accommodation (NRA/PRA was +2.50/-0.75). Interestingly, his retinoscopy was plano -0.25x180 OD and plano -0.50x090 OS. Upon refraction, he took nothing (plano OD and OS) and was able to read 20/20 with ease. The small cylinders here reflected both accommodative and binocular instability. In this case, we deferred any Rx at all and enrolled him into a vision therapy program. As we begin therapy, we will consider +0.50 DS OU at near.

Patient 4. Lest you think that this phenomenon is isolated to pediatric patients, this case involved a 26-year-old who spent considerable time on the computer during the workday. His entering acuities were 20/20 OD and OS at distance but were reduced to 20/30 OD and OS at near. He showed retinoscopic findings of -0.50 -0.25x085 OD and -0.50 -0.50x100 OS, through which he could see 20/20—but he could do that unaided. Upon refraction, he kept the -0.50 spherical component in each eye, but his cylinder portion increased to -0.50x090 OD (no change in OS).

Accommodative amplitudes and PRA were reduced (8.00D OD and OS and -1.25, respectively), and his MEM retinoscopy was +1.50. We performed a second retinoscopy following dilation, which showed +0.75 OD and +1.00 OS—with no remaining cylinder. He was ultimately prescribed +0.50 DS OU for all near work and asked to return for follow-up care (and possible vision therapy referral).

These cases illustrate how transient against-the-rule cylinder can creep into refractive findings. If we look closely, we can often see reduced or otherwise abnormal accommodative findings that accompany these cyls, but we have to look for them. Given the tendency for early astigmatism to lead to myopia, if we can avoid prescribing such cylinder, we can potentially prevent or slow down the onset of myopia. Your patients won't be bothered by the lack of cyl in their glasses (they may not even notice either), but they will certainly appreciate not starting down the myopic path. You will be doing them a huge favor! ■

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2022 INCOME: WORK SMARTER, NOT HARDER

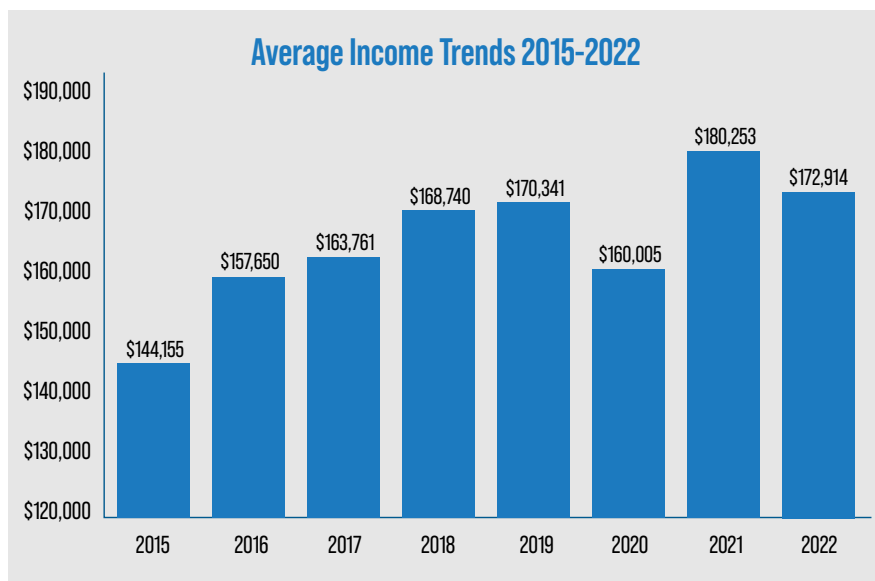
With optometry seemingly stabilizing after a volatile period, ODs have been tasked with implementing sustainable strategies and solutions for a more profitable future.

BY CATHERINE MANTHORP
SENIOR ASSOCIATE EDITOR

As the working class continues to navigate the ever-changing political, professional and personal landscape of the 21st century, when it comes to the aftermath of COVID-19's onset at least, optometry seems to have found its rhythm in the "new normal." Only 9% of the 700+ ODs who responded to *Review's* annual income survey reported a larger financial impact due to COVID this year than last—due to things like lower patient volume and higher practice costs. In part due to these factors and others including increased inflation, reduced reimbursement and decreased sales, just 13% noted that their annual income decreased over the last year in the field.

Down 4% from the annual income recorded by 2021's survey, this year's respondents made an average of \$172,914 in 2022, still up from the pre-COVID era and a potential indication that optometry's financial situation may be beginning to level out following the 2019 epidemic.

Along the same lines, the 84% of respondents who identified as full-



time reported a slight 3% decrease in their average take-home to \$180,716 in 2022. Part-timers experienced a more significant 15% drop to \$123,764, hitting especially hard after last year's 63% rise.

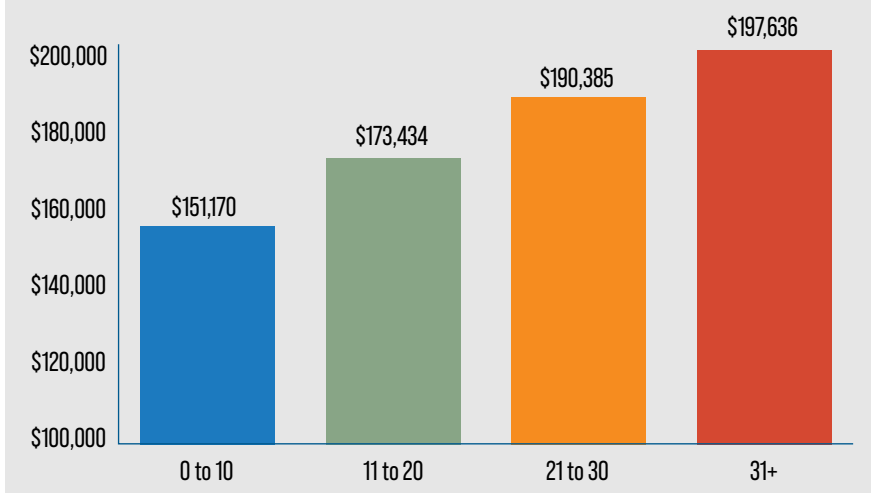
Editor's note: As always, be mindful that while we ask the same survey questions, the responses we compare from year to year come from different individuals, making trend analysis tricky, especially among a smaller cohort. The results offer a representative look at the profession but aren't considered statistically rigorous, particularly year-over-year comparisons.

In addition, while we recorded just over 700 responses this year, we omitted a small number of outliers that produced misleading data to improve the overall accuracy of the findings.

Employment Experience

Earnings by employment experience seemed to follow the trend emerging from this year's income survey: OD pay is stabilizing following an unstable period for the industry. The good news is that more experience equated to higher earnings to indicate that time and effort does pay off,

2022 Income By Years In Practice



at least for this year's optometrists, who more than made up for the mid-career plateau their counterparts experienced in 2021.

Survey respondents with up to 10 years of experience made an average of \$151,170 this year, down a mere 8% from 2021.

Those with 11 to 20 years of experience earned 15% more than their newer counterparts, at \$173,434. This represents an unfortunate 10% decrease over 2022 for this group, however.

Reporting 10% more than the previous experience bracket, ODs with 21 to 30 years of experience earned an average of \$190,385 in the last year—the only group to record a positive result from 2021 to 2022, with an 11% increase in take-home value.

Veteran optometrists—those with over 30 years of experience—made 4% less than they did last year but 4% more than their colleagues with 10 fewer years of experience this year, at \$197,636.

Worker Wages

Being your own boss has proved time and time again to benefit ODs who carve their own paths. While only 42% of respondents identified as self-employed, these ODs made an average of \$215,634 in 2022, 52% greater than those who are employed

but only made \$141,635 on average. This gap closed by 28% over the last year, with self-employed workers earning 14% less and employed workers earning 2% more.

“**Optometrist pay is not keeping up with inflation, while student loans/optometry tuition is greatly outpacing it.**”



Of those who are employed, there was a significant leap toward working for another OD or MD, at 52%, with the rest of this year's survey respondents employed at a commercial firm (20%), another institution (12%), a

hospital or VA (7%), an HMO or PPO (5%) or a university (3%).

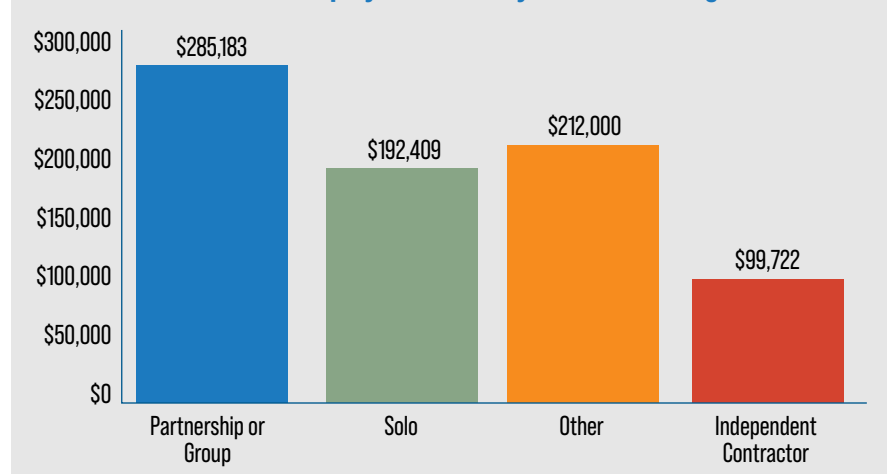
Working for another OD or MD dropped from one of the most profitable ventures in 2021 to the worst in 2022. These workers earned an average of \$131,492, down 14% over the last year.

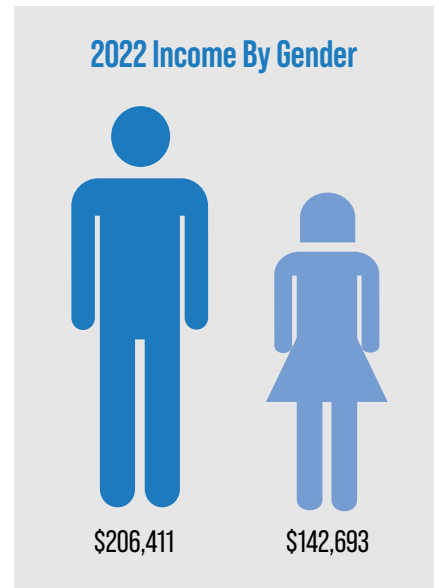
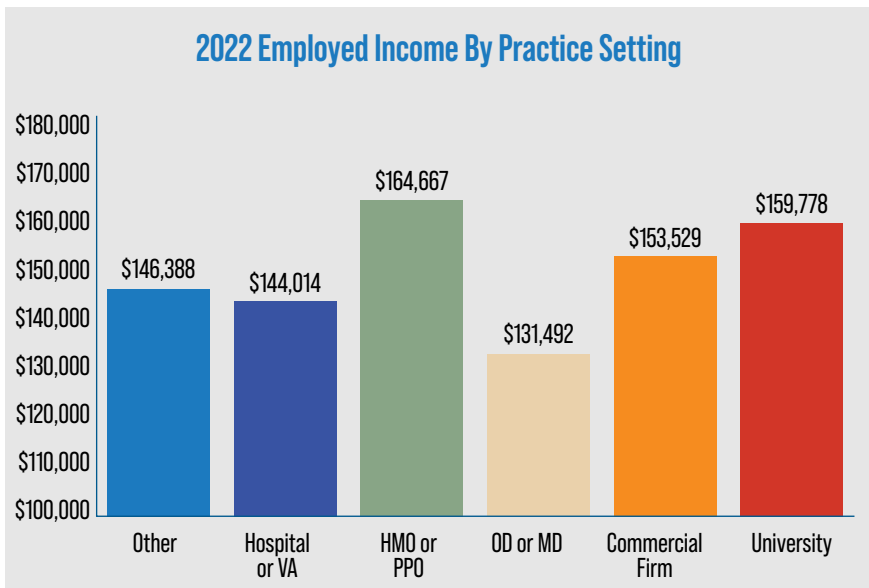
Hospital or VA staff (up 4% from last year to \$144,014) and those who chose the “other” option (down 19% to \$146,388) and topped the totem pole last year fell in rankings to make up two of the lower-paying gigs for ODs this year. Commercial firm workers landed the same ranking as 2021 but made 10% more to bring in an average of \$153,529 this year.

Employment through a university or an HMO or PPO, the least opportunistic settings for employed ODs in 2021, represented this year's most financially attractive ventures, with the former making 35% more than their counterparts last year at \$159,778 and the latter, a sizeable 91% more at \$164,667.

On the other hand, looking at self-employed workers, many ODs made the switch to solo work this year, with 58% venturing out on their own, 32% contributing to a partnership or group, 8% identifying as an independent contractor and 3% choosing the “other” option. Members of a partnership or group were the only self-employed category to enjoy increased earnings over the last

2022 Self-employed Income By Practice Setting





year, doing a flip-flop in rankings in the process.

Following the trend of the last several years, working as an independent contractor was the least profitable self-employment route, with ODs reporting an average of \$99,722 in 2022, down 56% from 2021.

Solo work (down 25% over the last year to \$192,409) and “other” self-employment opportunities (down 41% to \$212,000) both fell a ranking to two of the more intermediary prospects in 2022.

Moving from the bottom to the top of the chain, membership in a part-

nership or group came out ahead this year, earning 13% more than their colleagues last year at \$285,183.

Regional Riches

As if physical distance isn’t enough to separate each region of the United States, from the least to the most profitable place to practice optometry in the country existed a 66% gap in earnings in 2022, wider than it’s been in previous years.

ODs who practice outside the continental United States—in Alaska or Hawaii—were the least well off this year, recording an average income of

\$117,500 in 2022. Those working in the Mid-Atlantic/Lower Great Lakes region moved down a ranking and made 3% less than their counterparts did last year at \$164,556.

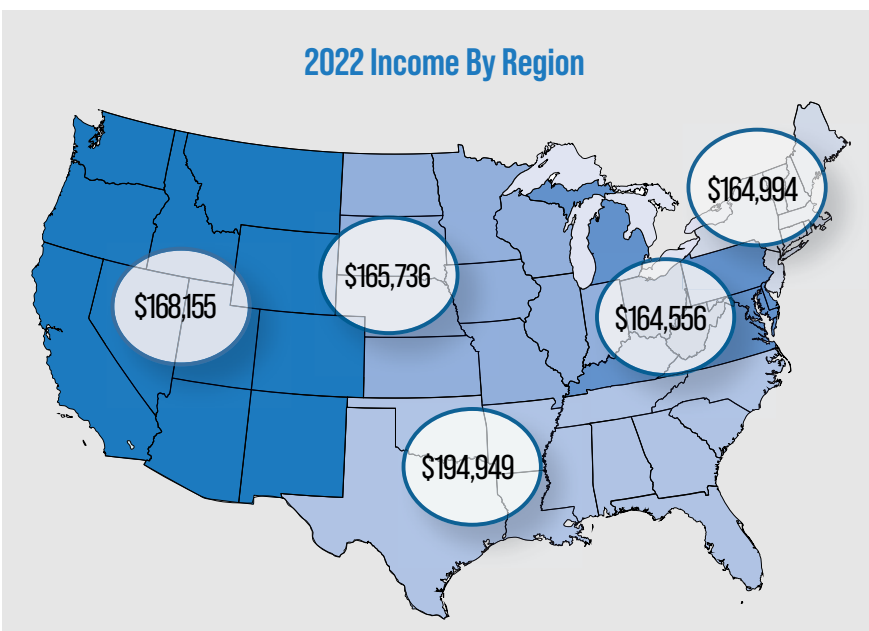
Almost mirroring the average annual income of their Mid-Atlantic/Lower Great Lakes colleagues, the Northeast (down 16% from 2021 to \$164,994) and Midwest (down 25% to \$165,736)—formerly at the top of the chain—both moved down two spots to become less financially attractive regions for ODs to practice in the United States.

Moving up from the bottom of 2021’s rankings, ODs living in the West reported an average take-home of \$168,155 in 2022, up 10% from last year.

Stealing the spotlight in 2022 and upgrading from their position among the more intermediary places to earn a living as an optometrist were ODs in the South, who fell to parity with last year’s income at an average of \$194,949.

Earning Equality

Optometry’s gender gap took a hit this year, widening by 31% over the course of 2022 to 45%. Men (46% of survey respondents) brought home 9% more than 2021 for an average of \$206,411 on the year. Women earned 14% less than last year, at \$142,693,



to put male and female ODs at odds with each other when it comes to earning equality across genders, which existed for this year's respondents at every level of experience.

Men with zero to 10 years of experience in the field reported an average income of \$185,249 in 2022, 40% more than female entry-level workers who made an average of \$132,278 in the same year. The gap increased by 16% over the last year, with men in this experience bracket making 3% more than 2021 and women, 8% less for a widening of the divide.



Reimbursement should be higher for the complexity of patients seen and amount of work performed.



Male optometrists with 11 to 20 years of experience in the field out-earned their female counterparts \$194,567 to \$159,168, closing last year's female-dominated gap by 17% to zero it out then widen it by 22% in their favor in 2022. Men with this intermediate level of experience made 10% more than last year, while women made 23% less but more than every other experience level for females in 2022.

Men with 21 to 30 years of experience practicing optometry claimed

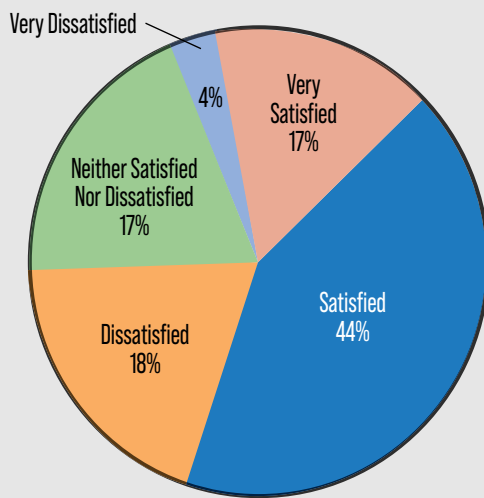
an average take-home of \$240,675 in 2022, 25% more than their counterparts made in 2021 and 78% more this year than their female colleagues in the same experience level, widening the gap by 46%. Females in this category reported an average income of \$134,891, down 8% over the course of the last year.

The most veteran male ODs saw their income take a dip compared with other experience levels for men this year, still up by a smidge compared with last year's numbers at \$210,209. This represents a 33% increase (up 13% from last year) from their female veterans in the field who brought in \$157,524, down 10% from 2021.

Lag and Lose

While not as prosperous a year for optometry as last, the majority of ODs seem to be taking a glass half full approach, with 61% reporting feeling satisfied or very satisfied with their income in 2022 (down from 70% in 2021). They claimed this was due in part to increased patient volume, product sales, professional fees, work hours and office staff.

How Satisfied Are You With Your Current Income?



Year to year, ODs seem to credit optometry's payout for their personal/professional balance, retirement savings, ability to pay off debts, comfortable lifestyle and flexible schedule, with survey respondents commenting that they love the job and how it benefits patients in need of eye care.

Unfortunately, in more recent years, more and more OD respondents have indicated their salary doesn't reflect their work and the skyrocketing rate of inflation as patients face increased costs of goods and gas, with an impending recession upon us.

"OD pay is not keeping up with inflation, while student loans/optometry tuition is greatly outpacing it," said one survey respondent. "Optometry

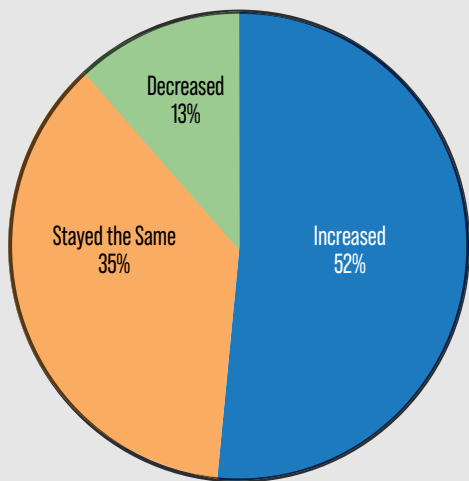
If Your 2022 Net Income Decreased, Which Factors Played a Role? *Rated on 1-5 scale (1 = least impact, 5 = most impact)*

1 2 3 4 5

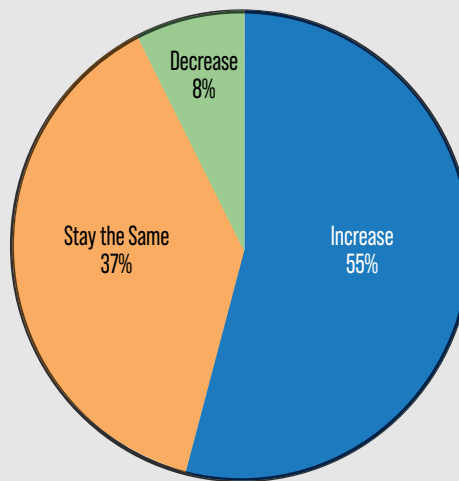
Weighted Avg.

Factor	1	2	3	4	5	Weighted Avg.
Inflation (professional expenses only)	23.3%	6.9%	15.8%	27.4%	26.7%	3.27
Cost of staff training/hiring/turnover	32.7%	8.2%	19.1%	19.1%	21.1%	2.88
Decreased insurance/plan reimbursement	29.5%	13.0%	25.3%	12.3%	19.9%	2.80
Decreased product sales	29.9%	13.6%	23.1%	21.8%	11.6%	2.71
Decreased patient volume	45.5%	9.7%	20.0%	11.0%	13.8%	2.38
COVID effects	38.6%	17.2%	21.4%	13.8%	9.0%	2.37
Increased competition from other practices	55.6%	13.2%	19.9%	6.0%	5.3%	1.92

How does your 2022 Income Compare with 2021's?



What Do You Expect of Your 2023 Income?



schools are already having a problem filling their classes with quality applicants, and the current trends will make it worse.”

As for the topic of insurance reimbursement, one OD remarked that “the cost of doing business continues to rise, but reimbursements do not.” Another reported, “Reimbursement should be higher for the complexity of patients seen and amount of work performed.”

Add to the mix the global labor shortage and optometry’s unmet staffing needs and the field has found itself in a bit of a pickle as it tries to increase patient demand while lacking the workforce to back these efforts.

Looking to the future, 55% of survey respondents expect their income

to increase in the coming year (down 68% from last year). One OD summed up what many seemed to be thinking, “I only wish optometry’s profession could behave more like dentistry and make a stronger effort to protect the value of our professional services. If that were the case, I think all optometrists would be more satisfied with their annual income universally.”

Adopt and Adapt

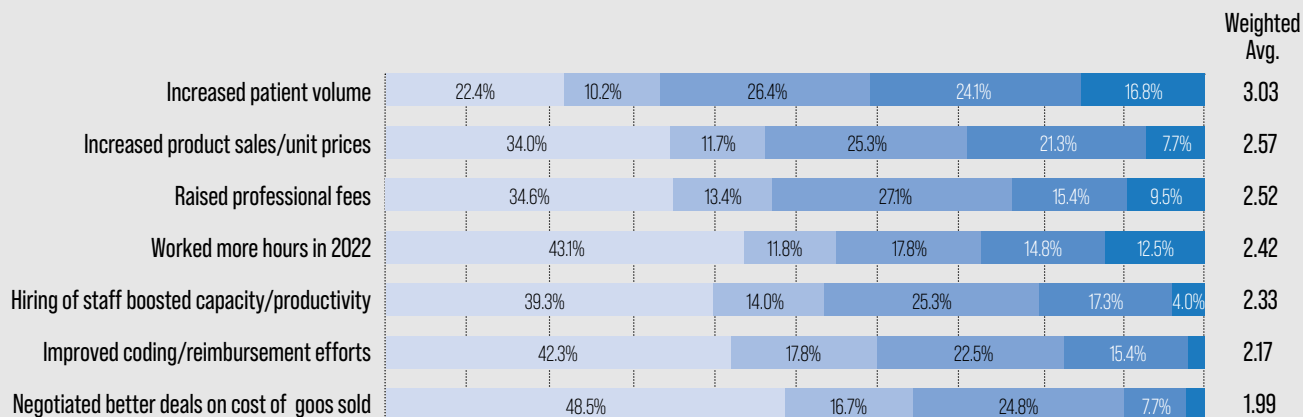
As is to be expected, some ODs fared better financially than others this year, taking into account experience, employment, location and gender. All, however, hopefully benefited in one way or another from optometry’s full-forced attempt at a return to “normalcy” in light of COVID-19.

The majority of survey respondents indicated a desire to continue building on this momentum, outlining plans to increase their profitability across the board in the years to come. Potential ideas include offering specialty services (myopia management, specialty contact lenses, vision therapy) and investing in specialty equipment, increasing staffing and scheduling, focusing on billing and pricing efficiency and expanding work hours.

Optometry is certainly feeling the effects of an ever-changing global landscape but continues to meet incoming challenges head-on, adapting as necessary along the way to ensure the profitability of the field and the prosperity of its patients. ■

If Your 2022 Net Income Increased, Which Factors Played a Role? *Rated on 1-5 scale (1 = least impact, 5 = most impact)*

1 2 3 4 5



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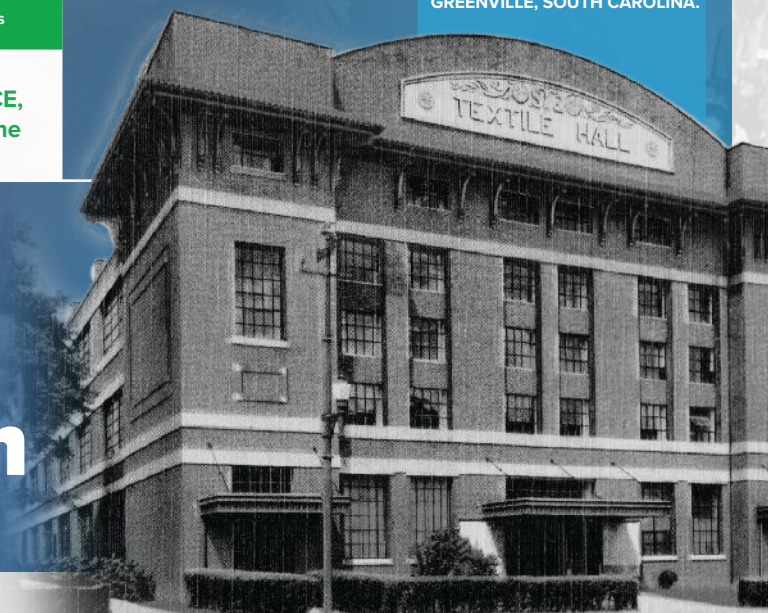
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GEARING UP FOR LASER AND MINOR SURGERY: ADVICE FROM EXPERTS

When advanced procedures become part of your state's optometric scope of practice, use these tips to efficiently and confidently add them to your clinic.

BY CATLIN NALLEY
CONTRIBUTING EDITOR

As scope of practice expansion efforts continue nationwide and more states are passing legislation, a growing number of optometrists are able—many for the first time—to practice to the full extent of their training and abilities, improving the level of care they can offer their patients. Two ocular procedures increasingly being recognized as part of optometry's scope of practice include laser and minor surgery.

Integrating new procedures into clinical practice can be a challenge requiring time, patience and, in most cases, financial resources. Here, we'll discuss how ODs can set themselves and their practices up for success.

Scope War Continues

Before we dive into the advice for ODs, let's review the outcome of several states' recent battles for expanded practice authority.

Since 2017, six states have passed crucial legislation allowing their optometrists to perform advanced procedures, including laser surgery. From least to most recent, they are Alaska, Arkansas, Wyoming, Mississippi, Virginia and Colorado.

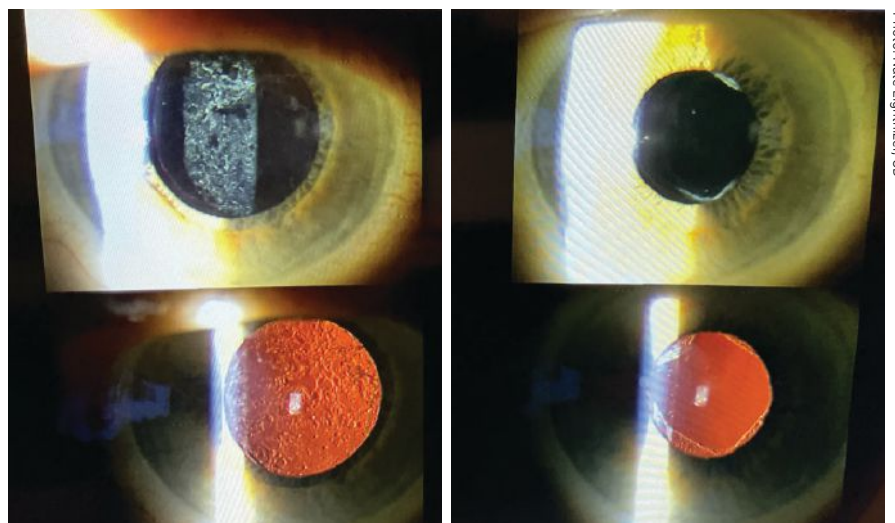


Photo: Nate Lightizer, OD

The photos on the left show the pre-op appearance of a patient with grade 3 posterior capsule opacification. The right two photos reveal the post-op appearance after a YAG capsulotomy was performed by an optometrist, showing perfect clearing of the posterior capsule. The patient's vision was 20/20, and they were thrilled.

“We have certainly seen the benefit to patients over the years as we've seen the practice of optometry grow and change,” says Dana Day, OD, of The Eye Institute of Wyoming and past president of the Wyoming Optometric Association. “It's hard for me to imagine a time when optometrists didn't even have the authority to dilate an eye, let alone prescribe any type of therapeutic drops for treatment of infections, inflammation or pressure control. Where would our

patients be at this point had scope expansion never occurred? It's for the benefit of delivering better, more timely eye care to our patients that expansion of scope happens,” he says.

The scope of practice for optometrists employed with the US Department of Veterans Affairs (VA) also expanded this past October when the VA revised guidelines that formerly stated that only ophthalmologists could perform invasive procedures. Now, the document states that

ophthalmologists or optometrists can perform various types of eye surgery, administer injections and remove lesions, provided it's allowed by law in the doctor's state of licensure.

However, just as we have witnessed legislative wins, there have also been temporary setbacks over the years, such as the recent veto of California's scope expansion bill, AB 2236. The legislation would have granted ODs the authority to perform several advanced procedures including three types of laser surgery—selective laser trabeculoplasty (SLT), capsulotomy and peripheral iridotomy—lesion removal, multiple types of injections and corneal crosslinking (CXL).

When defending his decision to veto the bill, Gov. Gavin Newsom cited concerns regarding education and training, noting that AB 2236 would have allowed ODs to perform the same procedures with one year of training as ophthalmologists perform after three years of training. Optometrists have since disputed this reasoning, arguing that the profession does have the necessary knowledge and skills to safely perform the procedures specified in this legislation.

“Optometrists have four to five years of rigorous classroom, laboratory and clinical training on these procedures—not ‘less than one year of training’ as was stated in the governor's veto announcement,” says Nate Lighthizer, OD, associate dean at NSU Oklahoma College of Optometry and one of optometry's chief advocates for scope expansion. Dr. Lighthizer routinely conducts training sessions on advanced procedures for optometrists across the country.

While disappointing, this development will not curtail scope expansion efforts in California and beyond. It does, however, underscore the importance of emphasizing training and education, which is fundamental to success for those performing the procedures, as well as the groups crafting legislation for other states. To see optometrists and advocates in more states have success in their endeavors

to expand the scope of practice, it will be crucial to continually educate the community and lawmakers on the safety and importance of adding advanced procedures to optometry's scope.

“It can take time and a lot of effort, but the patient is the reason for it,” says Dr. Day. “Even when a state's optometric laws do change, it can still take some time for things to ‘ramp up.’ State boards must go through the process of rulemaking to ensure public safety.” Your job as the practitioner, Dr. Day notes, is to “purchase the necessary equipment and implement proper staff training and office protocols to deliver consistent and successful treatment.”

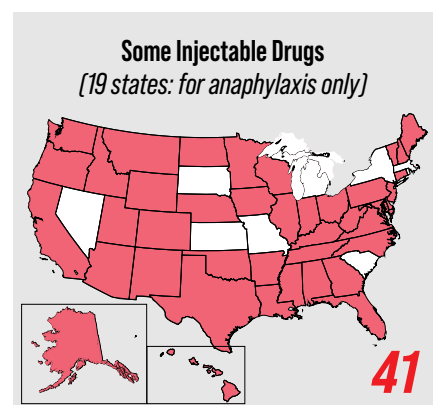
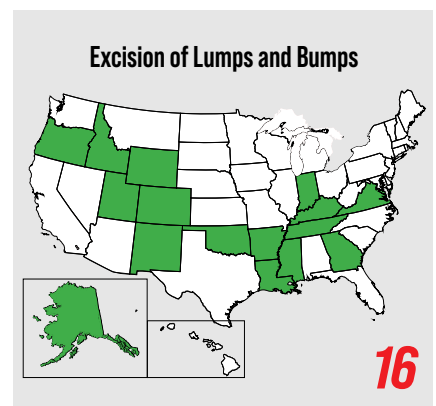
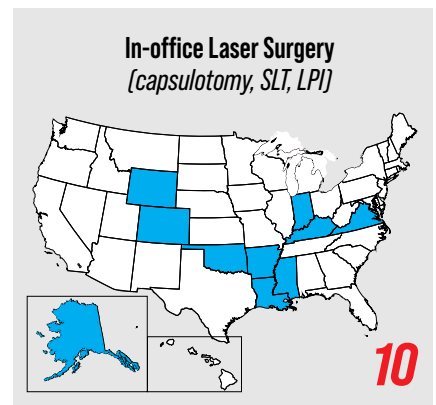
Credentialing Requirements

The first—and arguably most important—factor to consider when offering additional procedures at your clinic is whether additional certification or education is required. The credentialing process will differ by state, so it's crucial that ODs connect with their state optometric associations to ensure they take the necessary steps. Below, we discuss specific requirements in three states with recent scope expansion legislation.

Wyoming. In April 2021, Wyoming passed legislation that expanded optometric scope of practice to include YAG laser capsulotomy, SLT, laser iridotomy and lesion removal. It also amended optometrists' drug prescribing authority and granted board authority.

According to Kari Cline, executive director of the Wyoming Optometric Association (WOA), ODs in Wyoming interested in performing these procedures must complete one of the following education and examination requirements:

- graduate from an accredited college or university of optometry where the laser procedures and adnexa treatment were taught, as well as pass the National Board of Examiners in Optometry (NBEO) Laser and Surgical Procedures Examination; *or*



The maps above display the states where laser surgery, lesion excision and injections are currently part of the optometric scope of practice. Colorado and Virginia are the two newest additions to the laser and lesion maps, having won those rights in 2022.

- complete a Wyoming State Board of Examiners in Optometry approved training course on laser and adnexa of eye procedures.

No additional proctoring is required for treatment of adnexa procedures; however, laser procedures require a proctored session within two years of completing the education requirement prior to performing laser surgical

procedures. Proctoring may be performed by an optometrist or ophthalmologist licensed for these procedures.

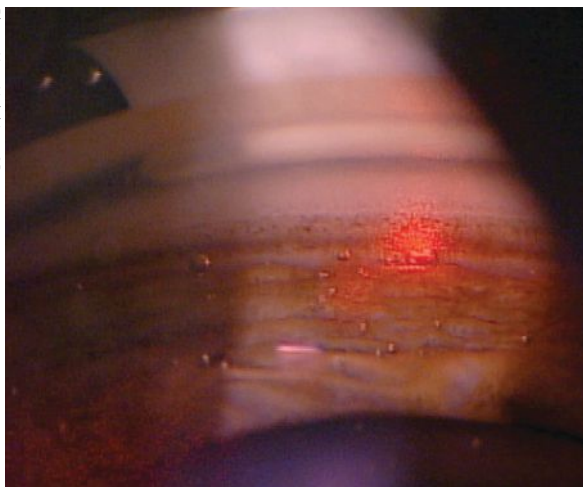
“The WOA is committed to providing ongoing continuing education (CE) for ODs to stay updated on all the procedures,” notes Ms. Cline. “We have CE conferences twice a year in which we offer a variety of courses in lasers and minor surgical procedures.”

Some optometrists in Wyoming have already begun to offer the new procedures at their practice, according to Dr. Day. “Whether it’s the removal of a benign periocular skin lesion or SLT, many more patients can now receive treatment by their established eyecare provider with whom they have a trusted doctor-patient relationship,” he says. He also points out that the scope expansion has helped reduce travel and waiting times for patients in need of timely care. “We have had many instances where patients put off having a needed procedure because of travel time or worrisome travel conditions that often develop here in Wyoming. When a patient can have some of these things taken care of locally, it makes his or her life better.”

Mississippi. Under HB 1302, which went into effect in July 2021, ODs in Mississippi now have the authority to perform injections, remove non-cancerous lid lesions and perform laser capsulotomy. Per the legislation, optometrists must meet the following requirements, explains Sarah Link, executive director of the Mississippi Optometric Association (MOA):

- Provide proof of current Mississippi license to practice therapeutic optometry that is in good standing.
- Provide proof of satisfactorily completing a Primary Eyecare Procedures (PEP) course of instruction as approved by the Mississippi State Board of Optometry (MSBO). The course of instruction must be provided by an

Photo: Nate Lightizer, OD



ODs in 10 states can perform various laser procedures, including SLT (pictured here), a quick and effective way to lower IOP in glaucoma patients.

accredited optometry, osteopathy or medical school; be a minimum of 32 hours in length; and be sponsored by an organization approved by MSBO.

- Complete and pass a written test.
- Pass a clinical skills assessment approved by MSBO.
- Participate in an eight-hour preceptorship with an MSBO approved preceptor.
- Any other requirements as directed by MSBO.

“All procedures included under HB 1302 require the full credentialing process before an optometrist is authorized to perform said procedures,” says Ms. Link. “HB 1302 also authorizes all therapeutic licensed ODs (not just PEP-credentialed ODs) to prescribe drug schedules II to V (expanded from the previously authorized schedules IV to V). To prescribe the additional drug schedules, an optometrist must update their DEA registration card,” she notes.

The credentialing process is the same for newer ODs whose education included the required training for these procedures, with one exception: the documentation for the training course. For those who graduate after 2021, the accredited school of optometry may turn in an affidavit to MSBO on behalf of the OD attesting to the equivalent completion of the 32-hour course as part of their training, accord-

ing to Ms. Link. Optometrists who graduated in 2021 or before must complete the full 32-hour training process.

To maintain the PEP credential, an OD must complete six hours of CE focused on PEP procedures (as part of their overall licensing renewal requirements). Regardless of PEP credentialing, ODs in Mississippi are now required to complete a two-hour course on the prescribing and diversion of narcotics—in addition to existing licensing renewal requirements—every two years.

“The MOA has sponsored three PEP courses in 2021 and 2022, partnering with the Southern College of Optometry,” notes Ms. Link. “Moving forward, the MOA will periodically survey members to assess the necessity of future PEP courses.

“PEP training courses are also offered periodically throughout the United States by other state optometric associations, and MOA will keep members informed of said training courses,” she adds. “Every OD in Mississippi benefits from the new bill, whether or not they proceed with the PEP credentialing, which has the potential to benefit patients statewide.”

Kris May, OD, legislative chair of MOA, credits the MSBO and the MOA as driving forces behind the successful implementation of the state’s recent legislation. “They did a fantastic job making sure that the certification process was complete, rigorous and upholds the highest standards while preparing the practitioner and their office staff to take on the expanded scope of practice.”

Colorado. In June 2022, Colorado claimed the title of the most recent state to pass optometric scope expansion legislation. Under HB 22-1233, the state’s optometrists gained the authority to perform certain advanced procedures such as lesion removal, injections and CXL, as well as three laser procedures: YAG capsulotomy, laser peripheral iridotomy (LPI) and SLT.

HOW TO PREP YOUR CLINIC

Incorporation of new procedures depends partly on the tools at your disposal. While the tools needed for individual practices will vary, Dr. Brog offers some suggestions to get started. He points out that this list is not exhaustive; there are many lens and tool options for ODs to consider investing in.

Supplies list for benign lesion removal:

- Signed informed consent
- Procedure checklist
- Postoperative instructions for the patient
- Blood pressure cuff
- Electrosurgical device and/or #11 disposable scalpels or equivalent
- Electrodes for the electrosurgical device (loop, diamond, ball and broad needle are the ones Dr. Brog uses most frequently)
- Povidone-iodine swab sticks and/or alcohol swabs
- Topical lidocaine gel
- Lidocaine and/or lidocaine with epinephrine and sodium bicarbonate (8.4% solution) as a buffering agent to be mixed 9:1
- 30g, 1/2" needles for injecting in and around eyelids
- Larger gauge needles for drawing up solution if desired and injecting chalazions (25g to 27.5g, 5/8")
- 1mL syringes
- Sterile cotton-tipped applicators for moistening and rubbing tissue during procedures (also used for application of betadine and antibiotic ointment)
- Sterile metal procedure trays to hold tools
- Forceps for holding and removing tissue (tissue forceps, smooth forceps and serrated-tipped forceps)
- Curettes of different sizes (Dr. Brog usually uses the smaller ones)

- Westcott and/or Vannas scissors of different sizes, including some that are straight and some with curved tips
- Chalazion clamps of different sizes, either spring-loaded or swivel-adjustable
- Biohazard specimen bags
- Sharps container
- Personal protective equipment (*e.g.*, gloves/masks/shields)
- Small Band-Aids and/or sterile gauze pads with gauze tape
- Headset magnifier
- Camera for taking before and after pictures to add to your chart notes
- Injectable Kenalog, if you are going to inject chalazia
- Small steam autoclave or chemical disinfection/sterilization unit for reusable surgical instruments

Supplies list for YAG capsulotomy/SLT/LPI:

- Signed informed consent sheets
- Procedure checklist
- Postoperative instructions for patients
- Blood pressure cuff
- Laser (Dr. Brog uses a combination YAG/SLT laser)
- Optional: YAG laser capsulotomy lens (*e.g.*, Abraham)
- SLT laser lens (*e.g.*, Latina, Rapid SLT)
- YAG laser iridectomy lens (*e.g.*, Abraham)
- Topical proparacaine for pre-procedure anesthesia
- Topical brimonidine for use pre- and post-procedure
- Conditioning solution for use with laser lenses (*e.g.*, Genteal Gel, Celluvisc, Goniosol, Goniovisc)
- Elbow rest if needed to help comfortably perform procedures

Permanent education and training requirements were adopted by the state's board of optometry in November. Per these rules, which take effect on January 14, 2023, ODs in Colorado will have to complete a board-approved 32-hour course, which includes at least six hours of hands-on clinical proctoring, according to Deanna Alexander, OD, legislative chair for the Colorado Optometric Association (COA). Doctors will have to maintain proof of completion and provide it to the board upon request.

"If more than two years lapse between laser procedures, an optometrist will have to repeat a clinical proctoring session with a currently certified optometrist or an ophthalmologist in any jurisdiction before they can do more procedures," notes Dr. Alexan-

der. "Additionally, ODs must report adverse outcomes to the state board of optometry."

Optometrists who have graduated in 2019 or later and passed a standardized national exam specified by the state board are considered certified and can perform the new procedures as of January 14, 2023, says Heather Gitchell, OD, a member of the COA legislative team. "If the OD graduated in 2019 or later but did not pass the laser and surgical procedures portion of the NBEO exam, they must follow the same process as every other OD seeking certification."

Since all the components of CXL were already a part of Colorado's scope of practice—debridement of cornea, use of drops and use of light—no additional training is required to perform

this procedure beyond manufacturer requirements for certain equipment.

There are a variety of educational opportunities available to Colorado ODs who want to expand the services they provide. To date, the COA has coordinated and planned two different courses taught by the NSU Oklahoma College of Optometry faculty in Colorado. The first was held this past summer and the second will be offered in February 2023 in Colorado Springs.

"Courses that meet the board's educational and training requirements are also routinely offered at NSU Oklahoma College of Optometry and the Kentucky College of Optometry, and periodically at other locations around the country," notes Dr. Alexander. "The COA will continue to offer courses locally until all Colorado ODs

who wish to be certified are enrolled in the course.”

When discussing the scope expansion in Colorado, Dr. Gitchell emphasizes that the intent of the legislation and initial DORA report was to allow Colorado optometrists to practice in line with their education and training, not create areas where new skills had to be learned.

“The various advanced procedures courses are an extension of our current education and training rather than the introduction of new knowledge,” Dr. Gitchell says. “The techniques, safety protocols and management of complications for all these procedures are built into current optometric education and have been for decades.”

With a looming shortage of ophthalmologists and an aging patient population, there is a need for other providers to offer a broader scope of in-office care, and optometrists are in the perfect position to fill that gap, according to Dr. Alexander.

“Optometrists have a full-time presence in more counties in Colorado than ophthalmologists,” she says. “Approximately 70% of Colorado ODs are enrolled as Medicaid providers, which will improve access to care for those most in need.”

Top Considerations

When you’re ready to take the leap and add minor procedures such as lesion removal or laser surgery to your practice, you’ll need to check several boxes to ensure you, your staff and your patients are prepared. Below, we discuss some of the key considerations, including stocking the equipment, educating staff and addressing administrative concerns.

Equipping your clinical practice. The exact tools and equipment you decide to invest in will depend on the specific needs of your practice, with factors such as budget and patient demand to consider. For minor surgical procedures, such as lesion removal, the initial investment doesn’t have to break



Photo: Glaukos

For Colorado ODs who recently gained the right to perform CXL, no additional training is necessary since the required skills were already part of the scope of practice.

the bank (see “How to Prep Your Clinic” for a list of recommended tools).

“Getting started is a very practice-specific process,” notes Dr. May. “For instance, equipment acquisition can be a significant investment. Your patient base will guide you; an office with a large geriatric population in a remote area may have very high demand for YAG capsulotomy, whereas a heavy pediatrics practice may not have any demand at all,” he points out. “The same is true for space allocation within the office. Some clinics are adding dedicated rooms for lid procedures and sterilization equipment while others are using more portable equipment and disposables.”

One of the first decisions for ODs adding laser surgery to their practice is whether to invest in a laser for their clinic or find another way to gain access to this vital piece of equipment. “If I were a doctor in Colorado, Virginia or one of the other states who recently gained the authority to perform laser procedures, I would purchase a combination YAG/SLT laser,” says Dr. Lighthizer. “The more optometrists who have lasers in their practice and are performing laser surgery, the more that laser procedures become embedded into the DNA of optometry.”

“One common misconception within optometry is that lasers are beyond the profession’s reach to purchase,” says Chris Wroten, OD, a member of

the Louisiana State Board of Optometry Examiners who practices full-scope optometry in that state. “Even brand new, a combination YAG/SLT laser from any of the major manufacturers is less expensive than an OCT. Further, many manufacturers offer their own refurbished lasers at a discount from time to time, not to mention the deep discounts available on secondhand lasers offered by established and reputable after-market sellers,” he says.

For ODs who aren’t yet ready or prefer not to purchase a laser, there are several alternative options to consider, such as working with a local ambulatory surgery center (ASC), suggests Aaron McNulty, OD, who practices at Louisville Eye Center in Kentucky. Optometrists can go to the ASC to perform laser procedures, and, in those cases, the OD would bill for the surgical fee, while the ASC bills a facility fee, he explains. ODs could also partner with a nearby optometric colleague and purchase a laser together, allowing them to share the financial burden while still ensuring they have access to needed equipment. Another option would be working with a company and renting a laser as needed.

Staff education and buy-in. No matter the type of procedure(s) being integrated into clinical practice, a key factor to providing excellent patient care is staff education, says Dr. May. “In the same way that each of the doctors are certified in PEP, the staff needs to be trained in supporting those procedures. This ranges from understanding procedures so that patients feel at ease to updating Occupational Safety and Health Administration protocols and maintaining safety,” he explains.

Dr. McNulty recognizes that when optometrists begin offering these procedures—whether it is laser or minor surgery—they are ready and willing to do a lot of the legwork themselves, but he notes that in the long term, this isn’t realistic. “Integrating these services into the daily and weekly flow of a busy optometry office will require significant delegation,” he says. “A lot of the pre- and post-op work can



“ I didn't realize
STARS
were little dots that twinkled ”

—Misty L, *RPE65* gene therapy recipient

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be delegated for maximum efficiency; however, doing so safely will depend on having highly trained staff who are equipped to take on those responsibilities.”

“**One of my staff members suggested we color-code the different procedures on the schedule. So, a quick look at the schedule tells us how many procedures and which procedures we will be doing that day or week.**”

Luke Brog, OD, an optometrist who practices in Wyoming and a member of the WOA Legislative Committee, actively involved his entire staff in the implementation process. “We still share a great bond when we have patients who come in for these procedures because we worked on it together,” he says. “One of my staff members suggested we color-code the different procedures on the schedule. We gave each a different color, so a quick look at the schedule tells us how many procedures and which procedures we will be doing that day or week.”

Dr. Brog put together a list of steps for himself and staff to follow before, during and after each procedure. One of his staff members then took the initiative to format it so it was easier to follow, and these lists have since become quick reference guides to help his office get all of the equipment ready for each procedure performed. “These checklists have been really helpful for the staff members and practice flow,” he says. “In cases when there’s a different staff member helping than usual, these lists have been invaluable.”

By including his staff from the start of the implementation process, Dr. Brog not only ensured his team was prepared and ready to assist with these procedures, but he also fostered an environment of team

accountability and support. “We all came together and worked through the details of how we would best implement these new procedures into the office,” Dr. Brog notes. “We have hired new staff members since we started performing these procedures. The staff that has been with us from the beginning love to train the new members of our team. They get excited, and that creates excitement for new hires.”

Administrative and insurance concerns. There are a variety of administrative-related logistics that an OD must be aware of when implementing services into practice. For instance, having consent forms on hand for each new procedure is key, notes Dr. Lighthizer. If ODs are looking for examples, he recommends visiting the Ophthalmic Mutual Insurance Company website (www.omic.com).

Another important consideration to address before performing any of these procedures is malpractice insurance. “It is imperative that you check with your malpractice insurance carrier to make sure that these procedures are covered under your current policy,” says Dr. Lighthizer. “You certainly don’t want to be performing laser procedures and then find out after the fact that they’re not covered.”

Patient outreach. As you navigate the clinical and administrative logistics of adding these services into practice, you

also must dedicate time to patient outreach and education. Make sure both established and new patients, as well as community members, are aware that they can now come to your office for these procedures.

“When you are attending local fundraisers or events, talk about your practice and what you offer,” recommends Dr. Lighthizer. “In your office, place signage and brochures that highlight the new procedures and how they can benefit the various needs of your patients.”

Reaching out to fellow ODs in your area can also be an effective approach. “Not every optometrist is going to have an interest in performing every procedure,” says Dr. Lighthizer. “So, communicate to your colleagues that you would be happy to perform these procedures and then send their patient back to them. We can, and should, support one another whenever possible.”

Optometric scope expansion provides value to ODs, patients and the community at large. “As scope expansion continues to take place, more and more optometrists will provide these services, and people will be able to gain easier access to comprehensive eye care,” notes Dr. Brog. “As for myself, it is really fulfilling to someone that is seeing 20/200 to 20/400, and in a few minutes with the YAG laser, help them to see 20/20 again.” He continues, “Scope expansion has been a wonderful addition to my practice. It’s a great feeling to be able to better help patients with their eyecare needs.”

Looking Ahead

As scope expansion continues across the country, optometrists must lean on and learn from one another together to ensure everyone is prepared for the mantle of responsibility that comes with additional practice authority. This includes ongoing legislative, regulatory, educational and community outreach efforts. In states that have already gained expanded practice authority, proper implementation of new legislation can set an example and pave the way to success in other states. ■



Lesion excision is increasingly being recognized as part of optometry’s scope of practice, currently permitted by 16 US states.

Photo: Jackie Burress, OD, and Rodney Bendure, OD



I was only seeing light flashes early on, but light

FLASHES

when you've not seen anything for
so many years—it was wonderful

—Keith H, retinal prosthesis recipient

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BROADEN YOUR HORIZONS TO INCLUDE LESION REMOVAL

For many, our scope now allows us to provide more convenient and effective care. Here are the best tips I learned along the way as I expanded my skills to include this service.



BY CORRI COLLINS, OD
LEXINGTON, KY

Over the past several years, optometrists have continued to expand their scope of clinical responsibilities throughout many states, which has led us now to the opportunity of adding injection and incision procedures into our practices. Being a recent graduate, I was able to incorporate this service into my practice from day one. I quickly learned how beneficial it was for optometrists to have the opportunity to provide these services for patients. Lack of these types of services requires patients to travel additional miles and spend extra time seeking care elsewhere that could have been managed by their local optometrist.

This expansion has been revolutionary for many optometric offices, as it not only provides increased convenience for our patients, but more importantly, it allows for the highest level of optometric care.



Photo: Jackie Burress, OD, and Rodney Bendure, OD

In the first image (left), lidocaine is injected in the lower left eyelid. Once the anesthetic is fully injected, you can see the area under the skin where the anesthetic fluid is (right).

Setting Up

While getting your office prepared to perform these procedures, it is vital to have specific procedure consent forms at the ready, as well as pathology vials and forms. In our office, we typically use the 10mL specimen containers. Additional needed equipment includes:

- Sterile betadine swabs
- Sterile towels
- Eye patches/pads
- 4x4" gauze pads
- 1" paper tape
- Syringes/needles (typically half inch to one inch with 25- to 27-gauge)
- Adson tissue forceps
- A scalpel (No. 3 or 4) with blades (11 or 15)
- Sharps container
- Chalazion clamps with curettes
- Westcott scissors
- Headband magnifier
- Anterior segment camera
- Local anesthetic (1% lidocaine with epinephrine 1:100,000 and 8.4% bicarb)

About the Author

Dr. Collins received her undergraduate degree from Georgetown College in 2015 and graduated with honors as a Doctor of Optometry from The Kentucky College Of Optometry in 2020. She has practiced at The Eye Care Center since 2020 and is a member of the American Optometric Association and the Kentucky Optometric Association. During her time as an optometric extern, she spent time caring for patients at the Franklin R. Sousley VA Hospital in Lexington, KY.

- 10 to 40m/mL Kenalog (triamcinolone, Bristol-Myers Squibb)
- Antibiotic ointment (my preference is erythromycin)
- High-temperature cautery device
- Autoclave with sterilization packs

Depending on the types of lesions you are planning to remove, an electro-surgical unit could be beneficial to your practice. It is also important to have an established account with a nearby lab for biopsy testing, such as Labcorp (our office uses them), which is a free service that provides free materials for your office, along with the designated specimen containers and necessary paperwork to evaluate lesions. If a lesion is biopsied, the service charge will be billed to your patient's insurance. As such, ensure that your patient is aware of this process. Additionally, remember to have this in consent form or another document stating that insurance will be billed in the event of a biopsy.

Preoperative Procedures

Initially, when I see a patient for a lesion removal, I always like to take a pre-op photo. This can be done simply with an iPhone (or another smartphone) or with a digital camera and imported into your EHR system. It is also great to hold a ruler up to the lesion to document the size. This allows for accurate documentation of the lesion for my reference and also results in instant satisfaction for the patient after comparing the pre-op and post-op photos.

Most of the lesions I find myself removing are stubborn, irritating skin tags. These small papillomas typically make their home in the creases of the eyelids, where most patients find them, to be uncomfortable or irritating and, in some cases, unsightly. Many of these lesions, if close to the lid margin, end up in the patient's line of sight and can be extremely aggravating. These lesions can also cause a low-grade chronic red eye due to the shedding of viral particles onto the ocular surface, which is another reason to remove them.

The size and location help me determine if a local anesthetic is necessary. I typically do not inject local anesthetic if the lesion is on a stalk and can be easily removed by clipping with surgical scissors. Instead, I will typically snip that type of lesion off without anesthetic, and the patient tolerates these procedures well. This is personal preference of mine due to the pain involved with the injection being the same, if not more, than what is endured with the removal alone.

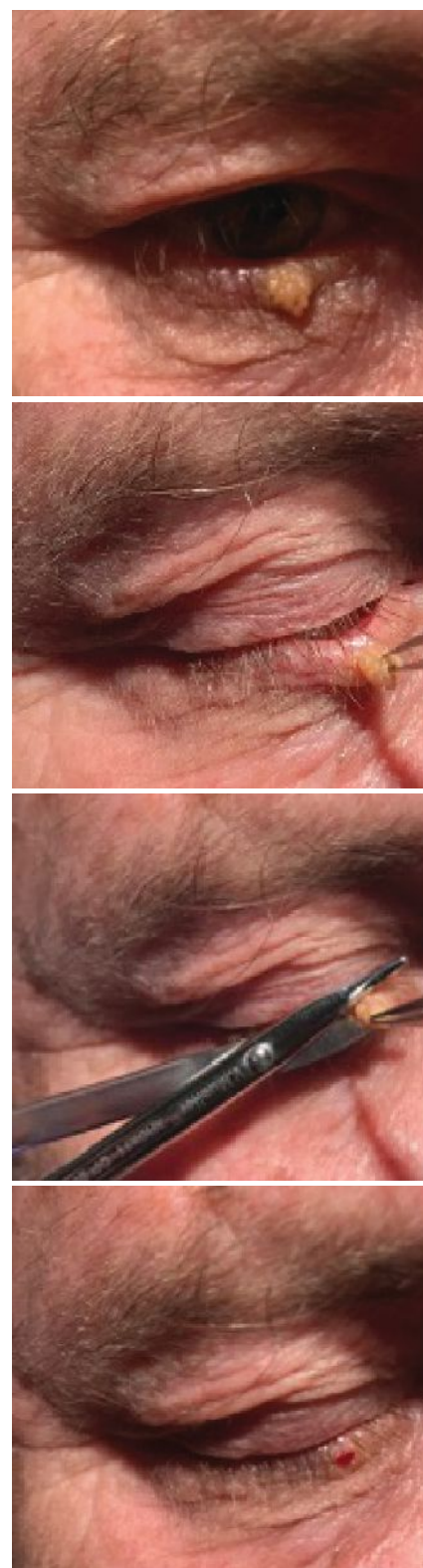
The process of removing these starts with a sterile environment. A sterile drape should be laid out with all the potential equipment needed as well as a sterile betadine swab, sterile gloves and erythromycin ointment on the side. I tend to remove my lesions outside of the slit lamp using a head-band magnifier, which allows for a much larger range of motion but with the same clarity.

Operation Technique

Begin by washing your hands thoroughly, then put on sterile gloves. Next, the sterile betadine swab is applied to the lesion and the surrounding area by starting at the lesion and circling out. Once dried, take the Adson tissue forceps to pull the lesion away from the skin, allowing for the best view of the base of the lesion. Then, take the Westcott scissors to cut the lesion at the base. If a biopsy is warranted, place the specimen in the container with the appropriate paperwork for it to be picked up by the local lab.

Usually there is very minimal bleeding involved in these procedures, and thus they require very little clean-up to the affected area. If the patient does happen to be a "bleeder," apply a handheld cauterizer. Note that it is not necessary to discontinue a patient's use of aspirin or any blood thinners prior to this procedure.

Lastly, apply erythromycin ointment to the affected area and prescribe the patient a 3.5g tube to use twice a day until they are seen again at their post-op. Typically this is two



A small papilloma is removed from the lower right eyelid. The forceps are used to pull the lesion taut to provide a clear sight to the base of the lesion. The Westcott scissors are used to cut the lesion at the base. Once the lesion is removed, the patient is left with a flat, smooth surface.

Photo: Jackie Burruss, OD, and Rodney Bendure, OD



Here are a few small papillomas located on the upper eyelid before and after removal. For more, visit <https://skinsurgeryclinic.co.uk/treatments/skin-tag-removal>.

weeks later, but they should be seen sooner if any complications arise.

In some instances, local anesthetic is warranted during the removal either due to the size of the lesion or patient preference; if so, an intradermal injection should be performed. To begin, it is not a bad idea to mark the lesion before injection to ensure the original borders. Insert the needle laterally at five to 10 degrees with the bevel up and aspirate to ensure correct location. Inject approximately 0.3mL to 0.4mL of anesthetic, gently massage the area and wait five minutes for the medication to take effect. Afterward, proceed as discussed previously.

Other Lesion Types

Hydrocystomas, otherwise known as sudoriferous cysts, are other lesions we remove quite often. These types can be easily lanced and drained in the office by taking a scalpel blade to open the cyst and draining the fluid while holding gauze pads to the area to help with clean-up. On some occasions, you will need to use the Westcott scissors to remove additional skin that could be present once the fluid is drained. Lastly, apply erythromycin ointment to the affected area, prescribe it twice

a day and evaluate it at the post-op in two weeks.

The third most common removals are chalazia. I like to err on the side of caution with this type and ensure that the patient has been using heat masks at least twice a day for at least three months before considering removal or intralesional injections.

“As with anything, there are absolute don’ts to keep in the back of your mind.”

When determining an intralesional injection (Kenalog) vs. incision and curettage, there are a few things to consider. Skin color is a large determinant. If the patient has darker pigmented skin, Kenalog could cause lightening of the tissue, leaving the area cosmetically unappealing. Therefore, this approach is typically contraindicated in darker-pigmented patients. The steroid injection is only about 75% to 90% effective, with 25% needing a second injection, whereas incision and curettage is greater than 90% effective.

To perform the intralesional injection, create your sterile environment as discussed above, apply the betadine to the affected area and inject either externally or internally. External injection will require you to inject tangentially to

the globe, while internal will require a clamp to evert the lid to inject. You will be injecting 0.2cc to 0.4cc of 10 to 20mg/mL, applying gentle pressure directly after and prescribing erythromycin ointment twice a day for one week. Incision and curettage require a clamp to evert the lid, a scalpel to create a vertical incision (allow 2mm to 3mm away from the lid) and a curette to remove the internal contents.

Lastly, forceps and Westcott scissors will be used to remove the fibrotic capsule to ensure it does not return. Once again, apply gentle pressure and prescribe erythromycin ointment twice a day for one week.

Operation Considerations

As you navigate into this new extension of care, remember to evaluate the lesion very carefully before you decide to cut into it. Always resort back to the ABCDE rule (see box below) for lesion assessment; this is vital in ensuring that you are comfortable with removing the lesion for biopsy vs. sending it out for a second opinion. Performing a biopsy on every lesion you remove is recommended, as it ensures you are ruling out any cancerous possibilities.

As with anything, there are absolute don’ts to keep in the back of your mind. Do not inject Kenalog into darker pigmented patients, as mentioned above, due to lightening of the skin. Do not use the Ellman on patients with any electronic implanted devices. This includes—but is not limited to—pacemakers, implantable cardioverter-defibrillators and cardiac resynchronization therapy. It is also important to remember that if you plan to biopsy a small lesion, don’t use the Ellman to remove it. The lab is not able to perform a biopsy on tissue that has been cauterized. You can, however, remove the lesion using scissors or a scalpel to send to biopsy and then clean up the area with the Ellman to ensure a good cosmetic outcome if the lesion is large. Finally, it is critical to not inject or cut into any lesion with suspicion of cancer.

THE ABCDEs OF SKIN LESION ASSESSMENT

- A—*Asymmetry*. Is the lesion asymmetrical?
- B—*Borders*. Are there blurred or irregular borders?
- C—*Color*. Is there more than one color present?
- D—*Diameter*. Is it larger than a pencil eraser? (about 6mm)
- E—*Evolution*. Has it changed over time?

Expanding Your Practice

When integrating these new services, ODs may face some challenges. Initially, there will be a large start-up fee involved due to the expenses for all the equipment and tools. The ongoing cost after everything is set up, though, is minimal.

Not having a large enough patient base may present another challenge. If you are in a single-doctor practice, it might be beneficial to recruit or pursue other doctors for referrals. Initially, billing insurances might be difficult because some companies do not initially recognize our scope, so reimbursements might take time to get straightened out.

Expanding your office services not only allows you as a provider to thrive in your business, but it allows us as a profession to service a larger population of patients while providing more convenience. Having patient access to multiple services in their community

decreases time and money spent traveling to seek those needs elsewhere.

Takeaways

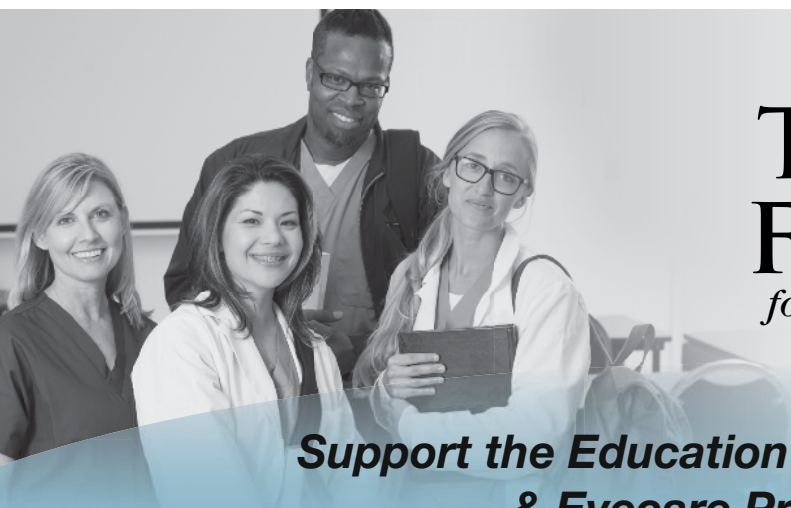
In Kentucky, since the scope of practice legislation passed in 2011, we've been able to provide the most efficient care to our patients in rural areas, which in turn decreases the patient's travel time and money spent seeking care. It has also allowed us to open other revenue streams, which is highly important for our business owners. It's no secret that eye examination reimbursements have been on a downhill slope. Incorporating this expansion into practices has subsequently allowed many practitioners somewhat of a replacement for that loss of income.

I have personally learned a lot throughout the process of offering incisions/injections in our office. One of the most beneficial concepts we added was having our local lab scheduled for pick-up and evaluation of the lesions

that are sent for biopsies, which creates a quick turnaround. I also felt it was advantageous to seek out referrals from other doctors who had patients with bothersome eyelid lesions.

As with any skill, confidence comes in time through experience. Being a young doctor, a lot of the time I feel as I'm not seen as experienced, and this has been an opportunity to show my capabilities to my patients. It also serves as a great way to gain and grow the patient's trust.

If you're considering expanding your services, my advice is to do it as soon as possible. Our profession has fought to expand our scope, so get out there and seize the opportunities given to us! Remember, our ultimate goal is to give the best, most efficient care to our patients. By integrating this in your practice, you will provide top-tier optometric care and be able to continue to service your patients with the level of attention and convenience they deserve. ■



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ABOUT RICK

Rick Bay served as the publisher of *The Review Group* for more than 20 years. To those who worked for him, he was a leader whose essence was based in a fierce and boundless loyalty.

To those in the industry and the professions he served, he will be remembered for his unique array of skills and for his dedication to exceeding the expectations of his customers, making many of them fast friends.



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TAKE CHARGE OF CATARACT CARE WITH LASER CAPSULOTOMY

Alleviating PCO—the most common complication of cataract surgery—is well within optometry's skill set. Learn how to offer this valuable service to your patients.



BY ALIA CAPPELLANI, OD,
AND SOPHIA LEUNG, OD
TAHLEQUAH, OK; CALGARY, AB

Modern cataract surgery has become so refined that risks are relatively low and complications are minimal. Posterior capsular opacification (PCO) is the most common postoperative complication, and most cases are easily managed. Capsulotomy using a neodymium-doped yttrium aluminum garnet (Nd:YAG) laser is the most effective treatment currently available.^{1,2}

PCO

This condition impairs patients' quality of vision through reduced visual acuity, decreased contrast sensitivity, glare disability and monocular diplopia; ophthalmic examinations are also impeded.² Despite today's advancements in surgical technologies and lens design, PCO

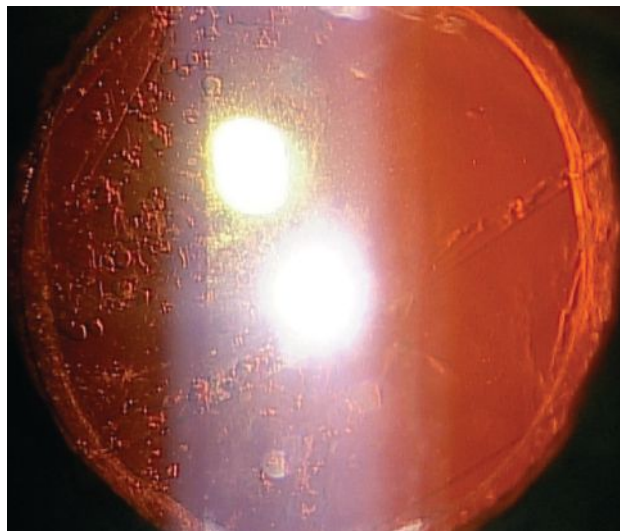
still occurs in up to 23% of patients from a few months to years after cataract surgery.³ The overall occurrence has been reported as high as 50% in adults and 100% in children.²

Development of PCO is influenced by a multitude of factors. Patient-related characteristics known to increase the risk of PCO include younger age, advanced-stage cataract, type of cataract (*i.e.*, subcapsular) and history of uveitis. Intraocular lens

(IOL) factors such as rounded-edge IOLs, hydrophilic materials and one-piece IOLs have shown a higher association with PCO formation.^{2,4}

PCO involves residual lens epithelial cells still present in the capsular bag after cataract removal. Migration, proliferation and differentiation of leftover lens epithelial cells is thought to be a wound-healing response following cataract surgery and the main cause of PCO.

There is more than one pattern of opacification. *Pearl-type (vacuolated) PCO* forms when lens epithelial cells undergo crystalline-expressing lenticular regeneration, appearing as clusters or grape-like collection of swollen lens epithelial cells commonly termed Elschnig pearls, or a peripheral annular ring of cells called a Soemmering ring. *Fibrosis-type PCO* is caused by fibrous metaplasia that produces folds and wrinkles in the posterior capsule. *Posterior capsular distension syndrome* occurs when



Elschnig pearls observed by retroillumination.

About the authors

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the lens remnants become trapped, absorb water and appear fluffy white. Intraoperative distortion of the bag can lead to *mechanical PCO* irregularities of variable presentations.

Clinically, PCO classification comes into play when choosing energy level settings used during laser treatment.¹

Laser History

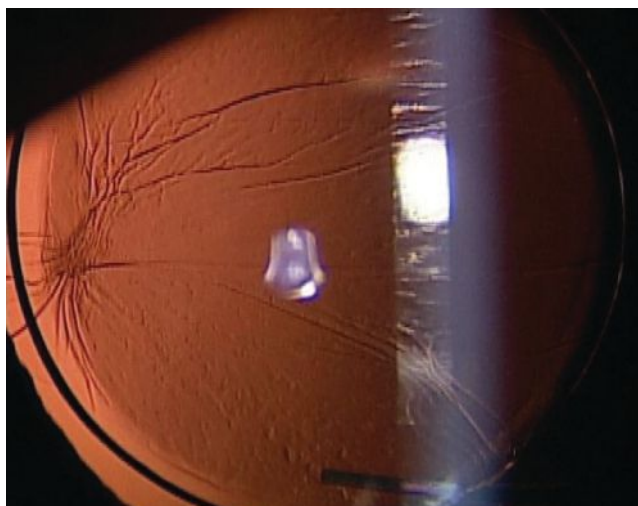
Nd:YAG laser capsulotomy is the standard treatment for PCO. Ophthalmic use of the laser was first introduced in the early 1980s, offering a safer and less invasive alternative to earlier surgical dissection techniques.⁵ A quick, high-powered pulse of the 1,064nm wavelength laser produces a plasma microexplosion that induces a shockwave that disintegrates the offending opacified capsule tissue.⁶

Although Nd:YAG capsulotomy offers a relatively fast and safe treatment for PCO, it may still pose risks to the patient. Careful consideration must be taken before, during and after the procedure to ensure effective surgical outcomes and limit potential complications.

Indications and Contraindications

Nd:YAG capsulotomy is indicated in cases of PCO that limit patients' vision-related activities or interfere with ocular disease management. Multifocal IOLs are more likely to render visual symptoms with earlier stages of PCO. Decreased visual acuity of two lines or more in normal lighting or by glare testing, known as brightness acuity testing (BAT), may be required for insurance qualifications; however, it is important to consider treatment in cases where subjective visual decline is greater than clinical signs.

Capsular contraction syndromes require treatment if opacification within the pupil margin or refractive shifts are observed, especially with plate haptic or pseudo-accommodating



Folds and wrinkles observed by retroillumination.

IOLs. Additionally, if pseudophakic patients undergo corneal refractive surgery enhancement, a “pre-refractive” capsulotomy is warranted.⁶

Contraindications for performing Nd:YAG capsulotomy include patients who are unable to fixate or sit still, glass IOL material and calcified IOL surfaces seen with older implant materials. Address any active ocular pathologies like uveitis or cystoid macular edema (CME) beforehand. Corneal pathology (scars, opacities and dystrophies) may obscure adequate views, thus making the procedure slightly more challenging. Patients with a high risk of retinal detachment must be monitored closely in the postoperative period.⁷

Informed Consent Considerations⁶

Paper or electronic means of informed consent with signatures from the patient, the clinician and a witness (typically a staff member) are important to obtain before the procedure. The form should include a simple explanation of the Nd:YAG capsulotomy, its indications, alternative treatments, postoperative expectations and possible adverse effects. A statement outlining that the counseling clinician discussed the procedure, risks, benefits, contraindications and expected results with the patient should be documented.

Pre-op Care

A comprehensive eye examination is required prior to performing the Nd:YAG capsulotomy with a record of best-corrected visual acuity and/or BAT. Dilated assessment of the anterior segment should include careful attention to any corneal opacities, the degree of capsular opacification and IOL positioning.⁶ Posterior segment evaluation is also required to assess the risk of retinal detachment, CME, ocular inflammation or other ocular pathology that may contribute to the patient's visual complaints.⁶

Procedure

Let's now review how to perform a Nd:YAG capsulotomy.⁶

1. Instill preoperative medications.

One drop of topical alpha-agonist, such as brimonidine (0.1% to 0.2%) or apraclonidine (0.5% to 1%), is instilled into the eye being treated. Use topical proparacaine in both eyes to control blink reflexes and improve patient comfort.

2. Review the laser settings.

a. Offset: 100µm to 250µm posterior for posterior capsulotomies. The offset allows the actual center of the shockwave away from the targeted plane to avoid unwanted damage to adjacent structures like the IOL.

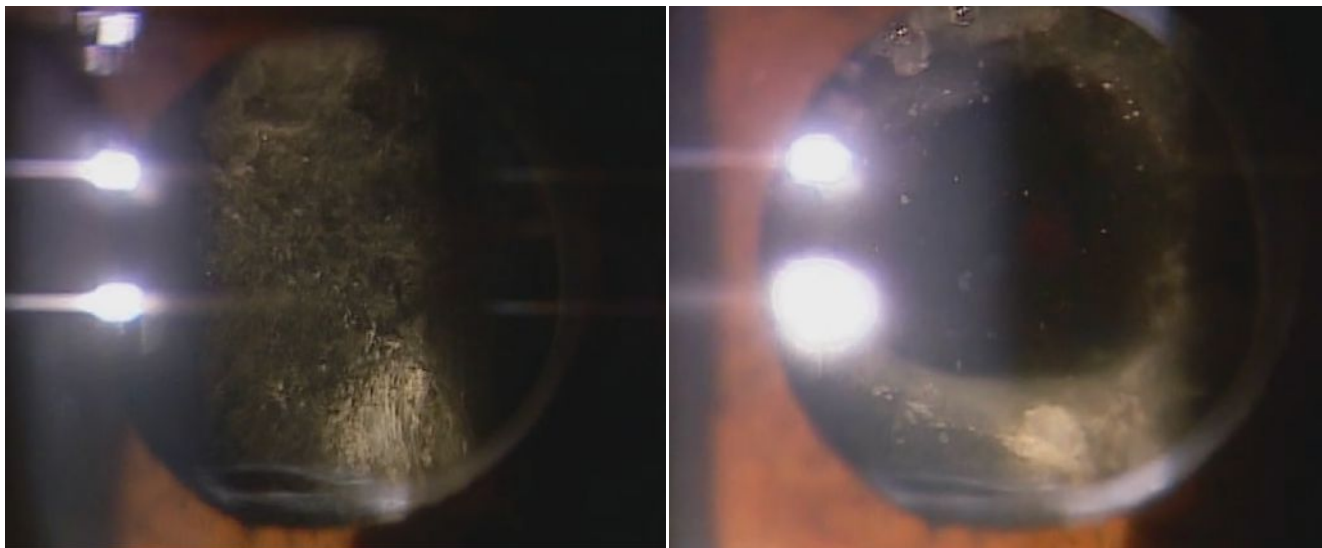
b. Energy: 1.0mJ to 1.8mJ initially. The lowest energy to complete the procedure is best; however, higher energy may be needed when treating more dense opacification.

c. Pulse: Single

d. Spot size and pulse duration: fixed. This cannot be altered with the Nd:YAG laser.

3. Align the patient in the slit lamp.

Advise the patient to focus on the fixation light and hold steady. Stabilization with an assistant or strap may be helpful in certain situations. Patients should be made aware of what to expect, including



Posterior capsular distension syndrome before and after Nd:YAG capsulotomy.

any “pops” or “clicks” as the laser fires and sensations behind the eye or head may be felt throughout the procedure.

4. Insert the capsulotomy laser lens (optional). Using a coupling solution such as Celluvisc (1% carboxymethyl cellulose, Allergan) or Gonak (2.5% hypromellose ophthalmic demulcent, Akorn) in the lens well, place the lens on the patient’s eye. A survey of ophthalmologists in 2015 reported 53% used a contact laser lens for this procedure.⁸ If not using the lens, artificial tears may be helpful in patients with ocular surface disease.

5. Fire the laser. The laser emits two beams that become one when the laser is focused. Starting outside the visual axis, align the laser on the posterior capsule and fire each laser spot immediately adjacent to the prior one. The capsular tissue can often be seen peeling away after the tension lines are loosened with each shot. Maintain at least 1mm to 1.5mm of untreated capsule from the edge of the IOL. There are two main patterns to firing depending on the physician:

a. Cruciate pattern. Starting at 12 o’clock, work vertically to six o’clock, then create the cross pattern, dissecting the horizontal from the center to periphery. Treat the remaining capsule flaps to retract out of the visual axis and enlarge the opening.

b. Circular pattern (“can opener”). Starting at seven o’clock, following a clockwise fashion peripherally until the inner capsular tissue falls posteriorly. With this method, no shots are along the visual axis, which may be beneficial for patients with retinal conditions or increased risk of CME.

6. Re-examine the capsule. Using retroillumination, inspect the treatment area for any strands or capsule remaining requiring further treatment.

7. Instill postoperative medications. After the procedure, one drop of topical alpha-agonist is instilled in the treated eye to reduce the risk of an intraocular pressure (IOP) spike.

8. Check IOP. Do this within one hour after the procedure, usually around 30 minutes.

9. Document the case. Thorough documentation of the laser settings, number of shots and total energy must be recorded, along with any intraoperative issues and the post-laser IOP measurement. The number of laser shots and total energy is highly variable depending on the severity of capsular opacification. A gross estimate is typically between 15 to 50 pulses with a total energy of 30mJ to 40mJ.

Studies show higher complication rates associated with total energy levels around 60mJ to 80mJ. If high energy levels are reached before

treatment is completed, a second treatment on a different day may be indicated based on risk assessment.⁹

Post-op Care

Prescribing topical NSAID or topical corticosteroid for one to two weeks following the procedure is strongly recommended to control postoperative inflammation.⁶ Educate the patient on the likelihood of them experiencing a mild amount of floaters within the first few days, which will decrease with time. They should also be counseled on signs and symptoms of a retinal detachment and advised to return to the clinic immediately should they occur.

A follow-up appointment should be booked one to two weeks post-procedure. Visual acuity, IOP measurement and dilated fundus examination should be performed at this visit. If the desirable outcome is reached, the other eye may be treated at this time, if required.⁶

Managing Complications

As with any ocular procedure, there is a risk of potential complications associated with YAG capsulotomies. Visually debilitating adverse events are uncommon but can include IOP elevation, IOL damage, uveitis, CME and retinal detachment.⁵

IOP elevation. The most common

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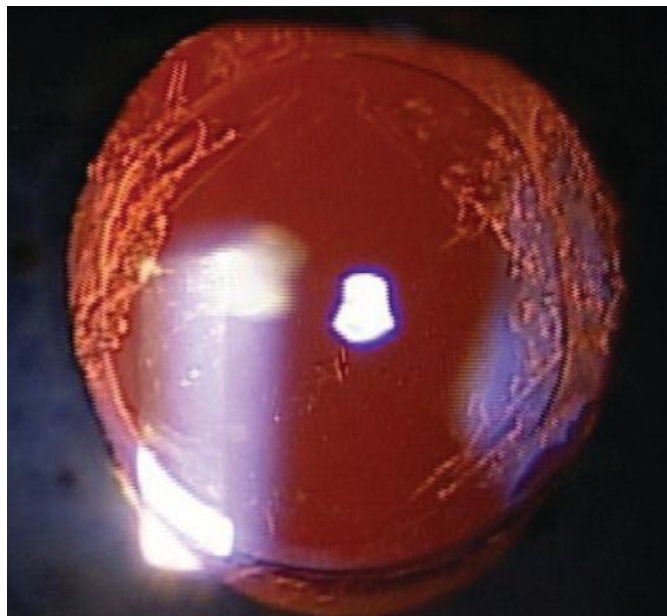
complication reported following laser capsulotomy treatment is increased IOP, with incident rates of 15% to 30% of cases in several studies.⁷ IOP begins to rise immediately post-procedure, although it is almost always transient, peaking at three to four hours.

Different explanations proposed for the rise in IOP include deposition of debris in the trabecular meshwork and angle closure from inflammation of the ciliary body. Other procedural factors like larger capsulotomy size and higher total energy have been correlated to greater increases in IOP. Prophylactic use of IOP-lowering medications substantially reduces the risk of IOP spikes, especially important in high-risk patients such as those with advanced glaucoma or steroid-responders.¹⁰

IOL damage or “pitting.” Laser energy focused too far anteriorly can result in shockwave damage to the IOL. Patient movement, inaccurate focusing of the laser and IOL material can be attributed to IOL pitting.⁶ Silicone material is more susceptible to damage, while acrylic materials are more forgiving. Pitting is rarely visually significant, although damage can occasionally cause glare or distortion, more so with multifocal IOLs. Adjusting the offset and starting treatment outside the visual axis can help minimize IOL pitting.^{10,11}

IOL movement. The Nd:YAG capsulotomy procedure has been shown to induce a posterior movement of the IOL. However, the significance of this on refractive error is debated. Both reported findings are more pronounced with larger capsulotomy openings, thus smaller treatment areas can limit this complication.⁵

Uveitis. Transient anterior chamber reaction can be observed after Nd:YAG capsulotomy, which should be controlled with postoperative topi-



Clear posterior lens capsule after Nd:YAG capsulotomy.

cal corticosteroids. Delayed complications and persistent iritis and vitritis are rare.⁵

CME. Any intraocular surgical procedure, trauma and several inflammatory conditions can cause a nonspecific inflammatory response in the macular area. The movement of the vitreous cavity, vitreous damage and vitreoretinal traction, resulting in the release of inflammatory mediators have been postulated mechanisms that induce CME development. Occurrences are low, especially if Nd:YAG capsulotomy was delayed for over six months after cataract surgery, but should be treated with topical corticosteroids and topical NSAIDs.¹⁰

Retinal detachment. Although data on the incidence of this after Nd:YAG capsulotomy is inconsistent, the rare but significant potential complication has been estimated to occur in 0.5% to 3.6% in patients who undergo laser treatment compared with no treatment.¹⁰ Stronger associations were found in patients with a history of retinal detachment, lattice degeneration, axial length greater than 24mm and posterior capsule rupture during surgery. This reiterates the significance of a thorough peripheral fundus examination prior to performing Nd:YAG capsulotomy to preop-

eratively address retinal defects or identify patients who need close monitoring.⁵

Takeaways

Nd:YAG capsulotomy is extremely effective and is the standard of care for treating symptomatic PCO. Improvement in visual acuity occurs in up to 96% of patients with guarded prognosis in patients with pre-existing ocular disease.⁷ Despite being a frequently performed, safe and non-invasive procedure, knowledge regarding appropriate techniques is key to limit the risk of potential complications and open a world of

clear vision for our patients. ■

Suggested reading: *The Ophthalmic Laser Handbook* Chapter 17: Nd:YAG Capsulotomy written by Jason Ellen, OD, and Sophia Leung, OD.⁶

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AN OD'S GUIDE TO USING LASERS FOR GLAUCOMA

Capitalize on recent scope expansion laws by learning to perform SLT and LPI.



BY CHRIS WROTEN, OD,
AND JEFF ANATASIO, OD
DENHAM SPRINGS
AND COVINGTON, LA

An estimated 80 million people worldwide have glaucoma—with 95% of cases being open-angle glaucoma (OAG)—including more than three million Americans currently living with the disease. The worldwide figure is forecast to increase to over 111 million people by 2040.¹ The prevalence of glaucoma increases with age in all patient populations, but African Americans and Hispanics are at higher risk overall. Its impact on patients' quality of life, along with the associated risk of visual field loss and blindness is well-documented and can be devastating, resulting in significant costs to the healthcare system and communities at-large. The direct cost and productivity losses to the United States economy from glaucoma are estimated at a staggering \$2.86 billion annually.¹

On the other hand, ocular hypertension exists when a patient's intraocular pressure (IOP) is el-

evated above normal (*i.e.* >21mm Hg), but there are no additional signs of glaucomatous damage such as progressive optic nerve cupping, retinal nerve fiber layer or ganglion cell complex thinning on optical coherence tomography (OCT) or visual field defects on automated perimetry. Ocular hypertension increases a patient's chances of developing glaucoma; as evidenced by the Ocular Hypertension Treatment Study, which found a 49.3% 20-year cumulative incidence of OAG in one or both eyes of patients in the observation group after adjusting for exposure time.² As a result of this risk, prophylactic treatment to lower a patient's IOP and potentially reduce the risk for glaucoma is sometimes initiated, depending on an individual's risk factors.

Generally speaking, in both OAG and ocular hypertension, the aqueous humor has adequate access to the angle of the eye where the trabecular meshwork (TM) is anatomically situated. In narrow-angle glaucoma (NAG), angle-closure glaucoma (ACG) and anatomically narrow angles (ANA), aqueous access



Fig. 1. An early Lumenis slit lamp-mounted SLT laser with foot pedal activation.

to the anatomical angle of the eye is obstructed to some degree by the iris, leading to IOP increases that can be acute, chronically progressive or even cyclical in nature.

While IOP in glaucoma may be elevated or within normal ranges at baseline, the mainstay of treatment

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remains the reduction of IOP, which can be achieved through medical, laser and/or conventional surgical interventions. Many patients endure significant financial burdens from the cost of medications, as well as experience unwanted side effects and/or struggle with adherence to dosing regimens. This results in poorly controlled disease and creates a need for alternative therapies.

Surgical procedures for glaucoma can offer as adjunctive therapy for medically-treated glaucoma or be an alternative therapy to potentially remove those burdens. These procedures range from in-office laser procedures to operating room-based surgeries such as minimally-invasive glaucoma surgery, conventional filtering procedures and more invasive tube-shunts.

Since their inception several decades ago, laser surgeries have gained widespread acceptance, proven to be safe and efficient and have become commonplace, given they are outpatient, non-incisional and relatively quick to perform. Currently, the most commonly performed laser surgery for OAG and ocular hypertension is selective laser trabeculoplasty (SLT), while the most common laser surgery for NAG, ACG and ANA is laser peripheral iridotomy (LPI).³

With numerous states in the US acknowledging the ability and skill of ODs to safely and effectively perform office-based laser surgeries—and that number is continuing to grow—thousands of patients have experienced the benefits of these procedures, with many more to come. To help get you prepared to perform these surgeries, we will give a general overview of SLT and LPI.

SLT

This procedure received approval from the Food and Drug Administration in 2001, several years after its original introduction.

It quickly became the glaucoma laser surgery of choice over its predecessor, argon laser trabeculoplasty (ALT).

SLT is performed with a q-switched, frequency-doubled variation of a neodymium:yttrium-aluminum-garnet (YAG) laser, operating with a fixed spot size of 400µm, a three nanosecond pulse and a wavelength of 532nm (Figure

1).⁴ It is a pigment-dependent laser, meaning the light energy transmitted is preferentially absorbed by melanin pigment in the TM when employed in the angle of the eye. While it is technically a variant of a YAG laser as noted above, the SLT laser is unique and is significantly different from the traditional YAG laser, which operates as a photodisruptive laser at 1064nm with a four nanosecond pulse.

Thus, a traditional YAG laser cannot be used to perform SLT, and the SLT laser cannot be used to perform YAG laser procedures (e.g., posterior capsulotomy, peripheral iridotomy). However, several laser manufacturers now offer combination YAG/SLT lasers that allow a single instrument to be switched from one laser mode to the other, in order to perform all the aforementioned surgeries (Figure 2).

While several studies have found that aqueous outflow is increased by SLT, the exact mechanism of action is still not fully understood, with the first of two main theories being mechanical stretching of TM tissue resulting in an opening of outflow channels to enhance aqueous drainage, thus lowering IOP.^{5,6}

The second theorized mechanism of action for SLT is a biologic effect that ultimately enhances aqueous outflow to reduce IOP, with clinical studies having shown SLT produces the following changes in the eye: modulating gene expression (specifically regarding cell motility, extracellular matrix production, membrane repair, and reactive oxygen species production); secreting cytokines; inducing matrix metalloproteinases; and ultimately remodeling TM.^{4,7,8} It is also postulated by some that the IOP-lowering effect produced by SLT may be a combination of

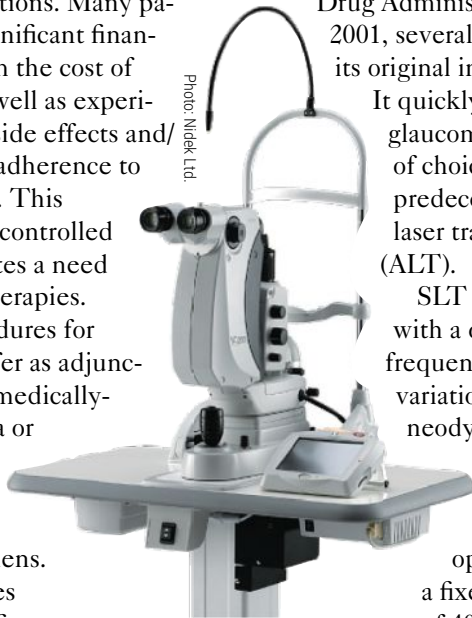


Fig. 2. A joystick-operated YAG/SLT combination laser.

TABLE 1. REPORTED AVERAGE IOP REDUCTION AND SUCCESS RATES OVER TIME POST-SLT¹¹

Time Elapsed Since SLT Procedure Performed	Average IOP Reduction (vs. pre-SLT IOP)	SLT Success Rates (% achieving >20% reduction in IOP)
6 months	21.8% to 29.4%	66.7% to 75%
1 year	16.9% to 30%	58% to 94%
2 years	7.7% to 27.8%	40% to 85%
3 years	24.5% to 25.1%	38% to 74%
4 years	23.1% to 29.3%	38% to 68%
5 years	22.6% to 32.1%	11.1% to 31%
6 years	22.8%	NA



Fig. 3. A single mirror, Latina SLT laser gonio lens with indexing bar.

both of these theories. Given the minimal structural damage to the TM induced by SLT, the biological theory has gained more traction and would anecdotally explain the phenomenon of a small reduction in IOP in the fellow eye often seen after the first eye undergoes SLT.

Numerous clinical trials have proven SLT to be as effective as topical medications, resulting in overall savings to patients and to the healthcare system, as well as enhancing patient outcomes by reducing or eliminating compliance challenges encountered with daily medication dosing.^{4,9,10} Furthermore, SLT is accepted as a primary therapy for OAG, with studies showing an enhanced effect in treatment naïve patients, and it is becoming the initial treatment of choice for glaucoma in some countries.^{9,10}

Clinical studies report various average IOP lowering effects from SLT over time, with a large range of success rates (defined as the percentage of patients achieving >20% reduction in IOP versus baseline) that all eventually wane (*Table 1*).¹¹

Because the pulse duration for SLT is much shorter than ALT (three nanoseconds vs. 0.1 seconds, respectively) and the SLT laser is fundamentally different than the

ALT laser, there is minimal scarring/damage to the TM. As a result, SLT is repeatable when the IOP lowering effect wears off (unlike with ALT), and it appears repeat SLT is comparable to initial SLT.⁴

Another potential variable in the efficacy of SLT is how much of the angle is treated. Several studies have compared 180° and 360° SLT treatment, with 360° treatment showing a slightly higher IOP reduction vs. 180° at 12 months in one case, although there was not a statistically significant difference in either study.^{6,12}

The most commonly reported predictor of SLT success is higher baseline IOP, with some isolated studies suggesting that certain corneal biomechanical factors, as well as a pre-SLT reduction in IOP of at least 15% with topical rho-kinase (ROCK) inhibitors, may also forecast success.^{4,13,14}

Contraindications and Complications

Contraindications to SLT procedures include neovascular glaucoma, uveitic glaucoma, active intraocular inflammation, media opacities and/or narrow angles that prevent adequate visualization of the aiming beam, and/or the angle of the eye and/or poor patient cooperation. Caution should also be exercised in the presence of retinal conditions such as an epiretinal membrane, cystoid macular edema and vitreomacular traction.

Nevertheless, SLT is generally recognized as very safe, with most complications being mild and fleeting. A summary review of published SLT complications reported transient inflammation/iritis in up to 83% of patients at two to three days post-procedure; transient IOP spike of 6mm Hg at one hour postoperatively in 4.5%; corneal haze in 0.8%; only two cases of hyphema in the literature; one case of choroidal effusion; and one case of foveal burn (due to surgeon error).¹⁵

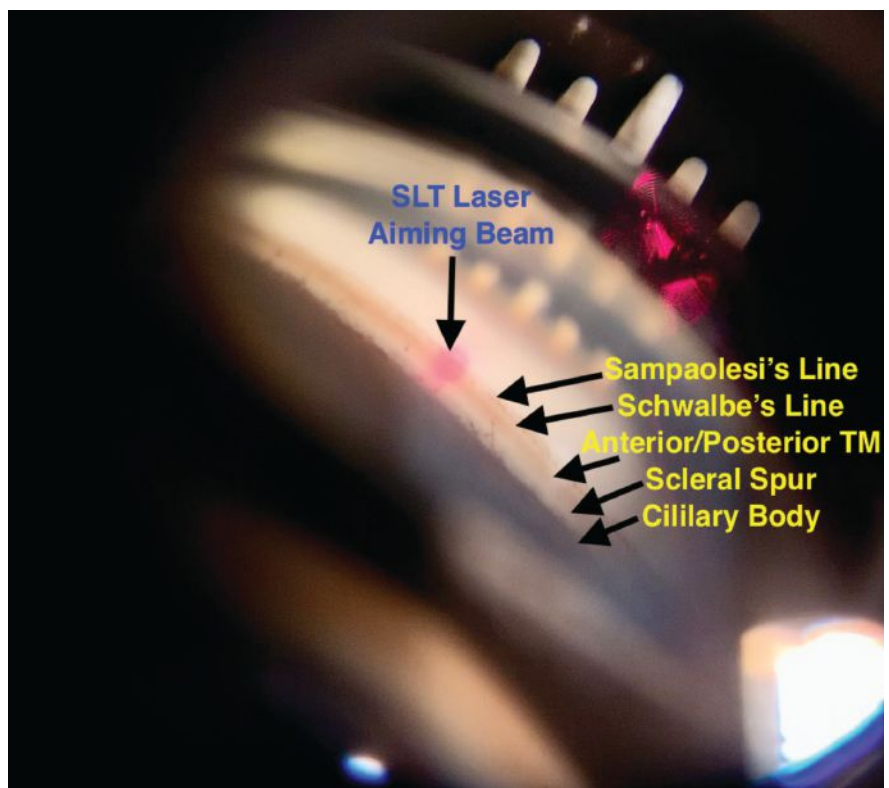


Fig. 4. A view of the angle of an eye through an SLT gonio lens, with the aiming beam focused on the trabecular meshwork.

Settings and Techniques

The SLT laser uses an aiming beam to indicate where treatment is being applied, with the laser power typically initially set between 0.6mJ to 1.2mJ per shot. After informed consent is obtained and topical anesthesia is applied, topical brimonidine or equivalent is instilled to prophylactically blunt any potential IOP spike.

An SLT laser gonio lens (*Figure 3*) is applied to the eye using a coupling solution such as goniosol, Refresh Cel-luvisc Lubricant Eye Gel (Allergan) or GenTeal Lubricant Gel (Alcon). Due to mild toxicity and discomfort with goniosol, our offices have made the switch to these other coupling solutions with good results.

The aiming beams are then focused on the TM using the mirror in the gonio lens, and the procedure is commenced, applying non-overlapping laser treatment spots side-by-side for either 180° (approximately 50 shots total) or 360° (approximately 100 shots total) (*Figure 4*). Adequate laser-tissue interaction occurs when minimal tissue reaction is noted or very small “champagne bubbles” appear in the aqueous as the laser is fired.

Special attention should be given to the amount of pigmentation present in the TM prior to surgery. The greater the pigment level, the lower the amount of energy needed to produce the same effect, given the pigment dependent nature of the SLT laser. In some patients with heavily pigmented TM, it may be prudent to perform SLT in one quadrant (*i.e.*, 90°) at a time to keep the risk of trabeculitis/IOP spike to a minimum. Once the procedure is completed, the lens is removed, the eye is rinsed, a second drop of brimonidine is applied and IOP should be assessed in one hour, with any spike treated appropriately.

A non-steroidal drop can be prescribed for the immediate post-op period if needed. Follow-up to assess IOP is usually scheduled within several weeks, keeping in mind there is generally a 10-day global period for SLT with many insurance carriers.



Fig. 5. A YAG laser is most commonly used to perform LPI. Pictured here is a Nidek standalone laser.

LPI

This surgery is employed urgently to emergently when a patient experiences acute angle closure (*i.e.*, the iris is positioned anteriorly such that aqueous access to the TM is completely obstructed) or when a patient with NAG or ANA—including plateau iris syndrome—is deemed to be at high-risk for angle closure.

For ACG and AAC, LPI generally should not be performed until IOP and any associated inflammation are first controlled.¹⁶ Keep in mind that hyperopes tend to have shallower anterior chamber angles, and gonioscopy should be performed on all patients prior to LPI. Further, studies indicate a 50% risk of developing AAC in the fellow eye for patients experiencing monocular AAC.¹⁷

LPI creates an opening in the peripheral iris, relieving pupillary block and allowing aqueous to bypass the traditional transpupillary drainage route and directly enter the angle of the eye. An argon or photocoagulative laser may be used by itself to perform LPI, offering a beneficial hemostatic effect (making it less likely to cause hyphema), but it takes longer to perform the procedure and this laser is less commonly found in eye care office settings. Combination LPI procedures can be performed in

which an argon laser is used to ablate most of the iris, with a YAG laser then employed to finish the iridotomy; however, this requires the purchase of two separate lasers. Thus, the YAG laser, (a pigment independent, photodisruptive laser without hemostatic effect), is most commonly used by itself to perform LPI (*Figure 5*).

A YAG laser operates at a wavelength of 1064nm and causes a focal, 27,000° F increase in temperature within its four nanosecond energy pulse. Since its wavelength is beyond the visible light spectrum of 300nm to 700nm, a focusing beam (commonly comprised of helium and neon with a wavelength of 633nm) is used to visualize the focal plane of the laser. The focusing beam consists of two separate circles that, when brought together, indicate the location of the laser's focal plane.

Contraindications and Complications

Contraindications include active intraocular inflammation, media opacities preventing adequate visualization of the focusing beam and/or the iris, poor patient cooperation and synechial angle closure from neovascular glaucoma or iridocorneal endothelial syndrome.¹⁶ Caution should also be exercised in

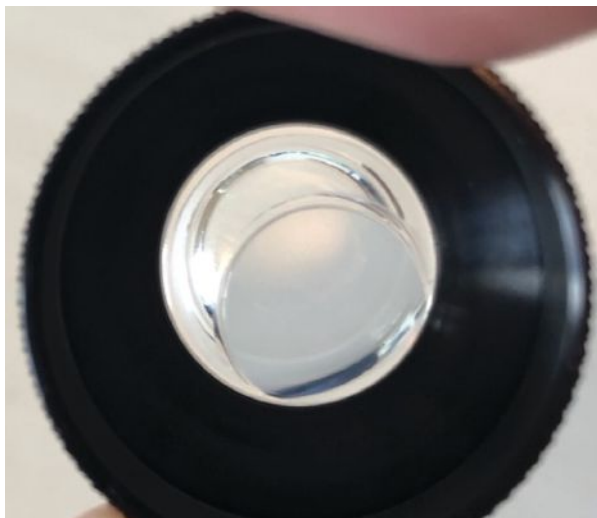


Fig. 6. An Abraham iridotomy YAG laser lens. Note the magnifying “button” that is offset in the lens.

the presence of retinal conditions such as epiretinal membrane, cystoid macular edema and vitreomacular traction.

Possible complications include transient IOP spike (in up to 70% of patients), uveitis, iris bleeding/hyphema (in up to 50% of patients), ectopia, focal cataract, corneal burns, posterior synechiae and subjective visual dysphotopsias.¹⁸⁻²⁶ Studies have hypothesized that these dysphotopsias may be the result of iridotomy position in relation to the lid and/or from the tear prism at the lid margin refracting light through the iridotomy. Clinical studies are contradictory as to the best location for LPI to minimize dysphotopsia risk, with some advocating for 3 o’clock or 9 o’clock, and others for 11 o’clock or 1 o’clock, but all agree that the vast majority of LPI patients will not experience dysphotopsia.²⁷⁻²⁹ In patients with uveitis who require LPI, there is also an increased risk of iridotomy closure.²¹

Settings and Techniques

For LPI, the YAG power is typically set between 3.0mJ to 4.0mJ per pulse to start, with a single, double or triple-burst setting, depending on surgeon preference. Most YAG lasers have variable anterior, posterior or zero-offset settings to account for the shockwave of energy that travels back

toward the surgeon when the laser is fired. The laser offset is most commonly set to zero for LPI (or at a small posterior offset). A laser lens designed for LPI that has a magnifying “button” to concentrate laser energy and magnify the iris (*Figure 6*) is applied to the eye using a coupling solution after topical anesthesia and is applied and once informed consent obtained.

While a laser lens is optional when performing YAG capsulotomy, it is used for LPI because of the aforementioned benefits, as well as offering the ability to use the lens to apply gentle pressure to the eye for 10 to 20 seconds to staunch the bleeding should it occur. Any resulting hyphema is treated accordingly.

Topical pilocarpine 1% may be instilled pre-LPI to induce miosis, thereby thinning the iris as it stretches in hopes of reducing the number of laser shots and total amount of

laser energy needed to accomplish the iridotomy. When using pilocarpine preoperatively, it is helpful to advise the patient of the potential for brow ache after administration. Topical brimonidine (or a similar non-inflammatory ocular hypotensive) is also instilled pre- and immediately postoperatively to blunt potential IOP spikes.

An iris “crypt” (*i.e.*, an area of thinner iris) located approximately one-third of the distance from the angle of the eye to the pupillary margin is an ideal site for an iridotomy. LPI has traditionally avoided the 12 o’clock position in the eye because the bubbles and debris that are liberated from the iris during LPI are lighter than aqueous, causing them to float to the 12:00 position and potentially obscure the view for subsequent laser shots. Regardless of the location at which LPI is performed, it can create a cloudy or hazy view during the procedure.

The surgery is continued until a characteristic “plume” of aqueous gushes into the anterior chamber, at which time a few more laser shots are applied to enlarge the LPI to about 0.5mm to 1mm in diameter (*Figure 7*). After post-op brimonidine

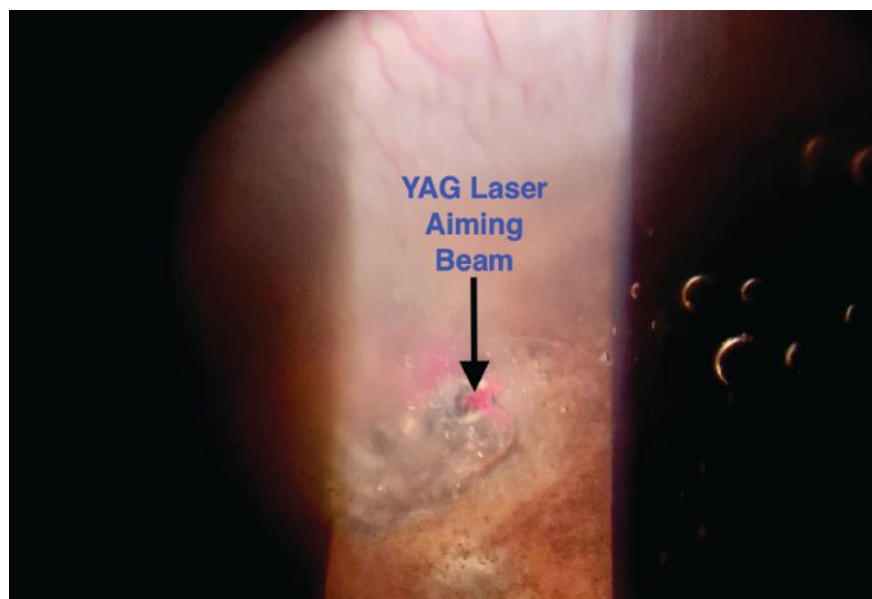
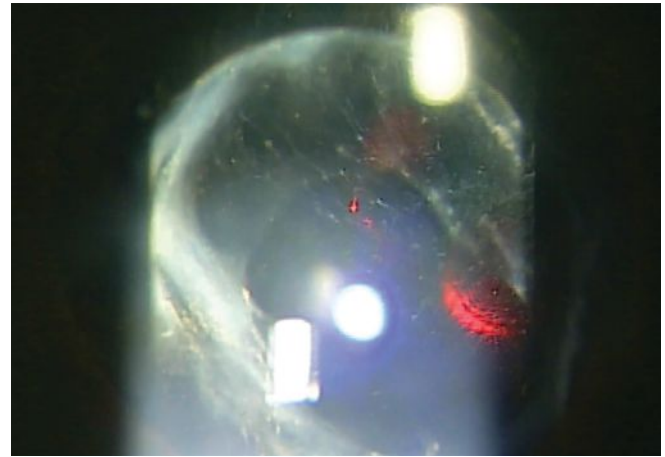
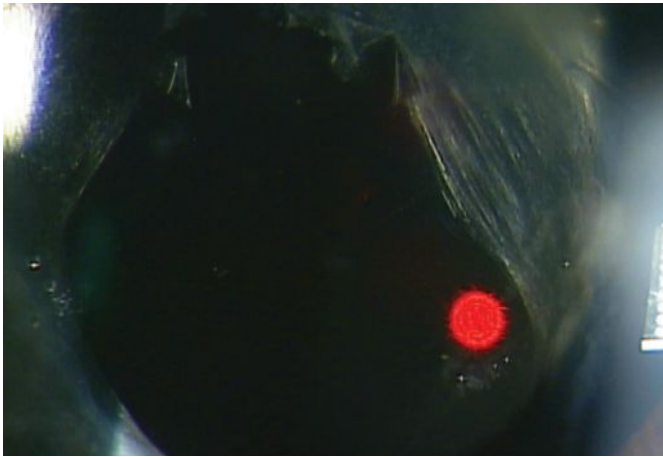


Fig. 7. This is a view of a YAG laser aiming beam focused on an iris crypt with early plume of aqueous into the anterior chamber during LPI. Also note the bubbles and debris beginning to cloud the view.



A patient before (left) and after (right) undergoing a YAG posterior capsulotomy.

is instilled, IOP is re-checked about an hour later. IOP spikes are treated accordingly and patients are typically discharged with a topical steroid dosed QID to prevent iridotomy closure and synechia.

Postoperative follow-up is generally one week (to assess IOP, iridotomy patency and gonioscopy for synechia formation, while hopefully confirming a widening of the anterior chamber angle) and at one month (to include dilated fundus exam).

Takeaways

Our understanding of glaucoma, the ability to diagnose it earlier and our options for effective treatment have never been greater than they are today. From new and emerging pharmaceuticals to alternative drug delivery technologies, evolving non-traditional therapies and cell and gene therapy research to current and still developing surgical advances including lasers and MIGS procedures, our opportunities to prevent vision loss for patients with glaucoma continues to exponentially expand.

Perhaps one day in the not-too-distant future we will even be able to restore vision that has been lost to glaucoma. In the meantime, SLT and LPI remain effective therapies for various glaucomatous conditions, offering numerous clinical benefits with favorable safety profiles, all while being performed in outpatient or office-based settings.

As optometric scope of practice continues to expand nationally and optometric education continues to teach, train and prepare current and future doctors of optometry, even greater access to these laser procedures will be afforded to patients. The future of effective glaucoma management is indeed bright for patients and doctors alike. ■

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BY JOSEPH W. SOWKA, OD

THERAPEUTIC REVIEW

One Last Time

Inflammation from dacryocystitis can be a minor nuisance.

A 62-year-old man presented emergently with a painful, swollen left lower eyelid of two days duration. His eyelid was acutely painful in the nasal region, and he had a mucopurulent discharge emanating from his lower puncta. His vision was unchanged, and he had no other complaints. His medical history was significant for thyroid dysfunction and elevated cholesterol, for which he was using medications. He was concerned that a family member living in his house currently had a methicillin-resistant *Staphylococcus aureus* (MRSA) infection.

He had a profound amount of lower eyelid edema and focal swelling in the canthal and puncta area. When palpated, he reported significant discomfort, and there was expression of mucopurulence. Clearly, the diagnosis was acute (presumptive) bacterial dacryocystitis.

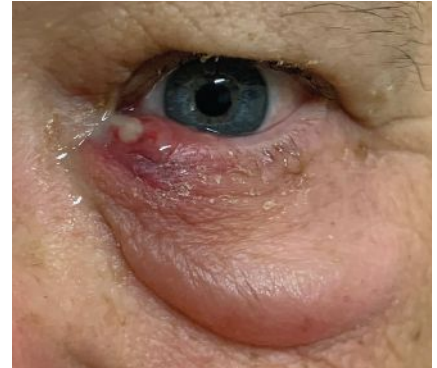
Background

Acute dacryocystitis, also sometimes referred to as lacrimal sac mucocele, is an infection of the lacrimal sac.¹⁻⁷ It occurs from trauma, lacrimal system obstruction or bacterial infection.¹⁻⁸ Dacryocystitis may also result from an extension of infective and inflammatory processes occurring within the nose or paranasal sinuses.^{3,4} In some instances, the infection (initially confined to the lacrimal sac) can extend to the soft tissues, causing preseptal cellulitis, or invade the orbital contents, resulting in orbital cellulitis.¹⁻⁷ The condition is typically unilateral.

Acute dacryocystitis often presents with symptoms of severe pain of the inner canthus in the area of the lacrimal sac just under the medial canthal ligament. Local redness, swelling, epiphora, secondary conjunctivitis, mucoid discharge in the morning and an enlarged, lacrimal sac that is tender to the touch are typical features. Highly diagnostic is mucopurulent discharge regurgitating from the puncta when palpated.¹⁻⁸ A firm round nodule is often palpable in the setting of adjacent orbital or preseptal cellulitis.¹⁻⁷ Patients with acute disease are rarely febrile.

The nasolacrimal ducts consist of the upper and the lower lacrimal canaliculus, the lacrimal sac and the nasolacrimal duct, draining tears into the lower meatus of the nose.⁹⁻¹⁸ The puncta define the outermost boundary and beginning of the nasolacrimal apparatus. Each punctum respectively leads into the superior and inferior canaliculus, which extends 2mm vertically to the ampulla. From there, the canaliculus makes its turn medially toward the nasolacrimal sac.^{11,12} In 90% of the population, the superior and inferior canaliculi come together to form a common canaliculus that drains into the lacrimal sac. In the other 10% of the population, the superior and inferior canaliculi connect directly into the lacrimal sac.¹¹

The epithelium lining of the lacrimal sac and the nasolacrimal duct is covered by microvilli.⁹ Antimicrobial peptides, IgA and immunocompetent cells (lymphocytes and macrophages) provide an antimicrobial defense.⁹ Un-



Symptoms of dacryocystitis include a painful, red and swollen tear sac that may produce a pus-like material that seeps out of the punctum when pressure is applied as seen in the patient presented.

der normal circumstances, the embedded blood vessels of the system maintain vegetative control deep within the system known as the cavernous body.⁹ Malfunctions in the cavernous body and/or in its innervations may lead to disturbances in the tear flow cycle, creating ocular congestion or total occlusion of the lacrimal passage.

Any descending infection from the eye or ascending infection from the nose or sinuses can initiate swelling of the mucous membrane and remodeling of the tissues, creating malfunctions in the cavernous body with reactive immunomodulation and occlusion of the lacrimal passage. Alterations in the ductal epithelium and the lamina propria encompassing the lacrimal sac and nasolacrimal duct can permit microbial growth.

The most common gram-positive infective organisms include *Streptococcus pneumoniae*, *Staph. aureus* and *Staph. epidermidis*, while *Haemophilus influenzae*, *Pseudomonas aeruginosa*, *Serratia marcescens* and *Klebsiella pneumoniae* are the leading the gram-negative bacteria.^{1,2,19} Mononucleosis and coliform bacteria are rare but documented sources of dacryocystitis.^{5,20}

About
Dr. Sowka

Dr. Sowka is an attending optometric physician at Center for Sight in Sarasota, FL, where he focuses on glaucoma management and neuro-ophthalmic disease. He is a consultant and advisory board member for Carl Zeiss Meditec and Bausch Health.

In adults, gram-negative bacteria are more common, while in children, gram-positive isolates are still the major infection pathogen. Virulent organisms are more common in acute dacryocystitis than chronic dacryocystitis.²¹ MRSA infections also occur more commonly in acute dacryocystitis.²²

Treatment

Gentle digital massage (to express the contents of the sac) can be attempted for lesions discovered early.²³ Unfortunately, this therapy tends to be ineffective, with less than 25% of lesions resolving spontaneously or with hot compresses alone.²⁰

Acute dacryocystitis in adults is best managed with warm compresses, topical antibiotic drops and ointments and a seven- to 10-day course of oral antibiotics.^{1-8,19,20} The topical antibiotics of first choice include the fourth-generation fluoroquinolones. Excellent choices in oral antibiotics include Augmentin (amoxicillin + clavulanate, GlaxoSmithKline) 500mg BID, Keflex (cephalexin, Advancis Pharmaceutical) 500mg BID, Levaquin (levofloxacin, Johnson & Johnson) 750mg QD or 500mg BID, doxycycline 100mg BID and azithromycin 500mg PO with one dose on day one, followed by 250mg PO on days two to five.

Mild cases of dacryocystitis in children often self-resolve, while more severe forms should be managed with

antibiotic therapy with consideration to dose-adjusting based upon weight. When in doubt, consultation with the pediatrician is recommended.

Surgical solutions are needed in both acute and chronic cases when conservative treatments fail.^{1-5,24} Dacryocystorhinostomy is the typical surgery for treating acute adult dacryocystitis.¹⁹⁻²² It involves resection of the bony area around the nasolacrimal canal for the purposes of gaining access to the stenotic area within the drainage system. The procedure permits the shunting of tear flow around any blockage by creating a new anastomotic passageway.¹⁻⁴ The procedure is gaining popularity because it permits the surgeon to immediately drain and culture the abscess.

New treatments for dacryocystitis include endocanalicular laser and endoscopic intranasal surgical techniques.^{19,24} These revolutionary methods permit the cavity to be accessed without opening the entire passage.²⁴

The patient presented here was diagnosed with acute bacterial dacryocystitis. He was prescribed topical moxifloxacin QID OD and, due to the potential of having MRSA as the potential cause, was additionally given a 10-day course of doxycycline 100mg BID, which has been shown to be an effective agent against MRSA.²⁵ He was appointed to return in 10 days but was lost to follow-up. ■

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PASSING THE BATON

After 18+ years of writing Therapeutic Review, I find it time to sign off and make way for *Review of Optometry* to give another an opportunity to provide a fresh perspective. I have enjoyed providing readers with clinically relevant content and having the opportunity to work with numerous editors over the years. I am indebted to the guidance, vision and friendship of Editor-in-Chief Jack Persico, as he was my biggest supporter all these years. I will remain with *Review* in an editorial capacity and will write manuscripts from time to time.



I am pleased to introduce readers to my more-than-worthy successor, Jessica Steen, OD. I have had the pleasure of working with Dr. Steen for several years. We began working together when she did her residency with me at Nova Southeastern University and continued when she joined me on faculty. She always impressed me with her intellect, insight and academic and clinical ability. Over the years, I have seen her professionally develop exponentially and rapidly learn things that took me years longer to achieve.

She has blossomed into a leader in the profession and represents our future. It is truly gratifying when the student surpasses the teacher. I wish her the best in this endeavor.

Cheers,
Joe



BY JAMES L. FANELLI, OD

GLAUCOMA GRAND ROUNDS

Expect an Expert

A new patient presents requesting a second opinion regarding her glaucoma diagnosis. Are you prepared to handle the situation?

Several weeks ago, I received a call from an acquaintance who asked if I was interested in rendering a second opinion for a colleague of hers who was unsure of the management plan a glaucoma specialist had recently prescribed for her patient. Since this is clearly in my wheelhouse, I accepted and saw the

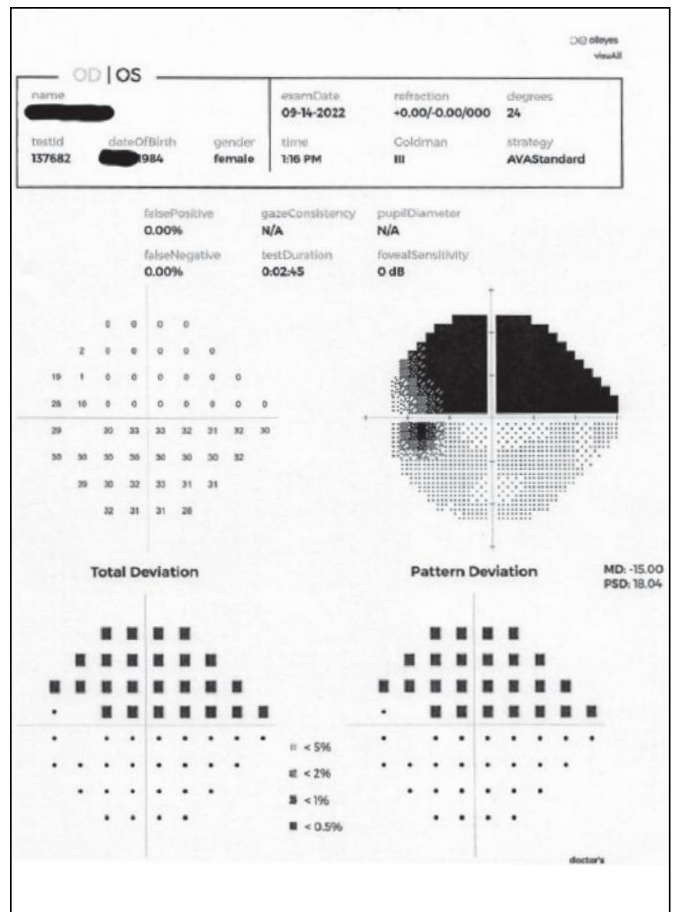
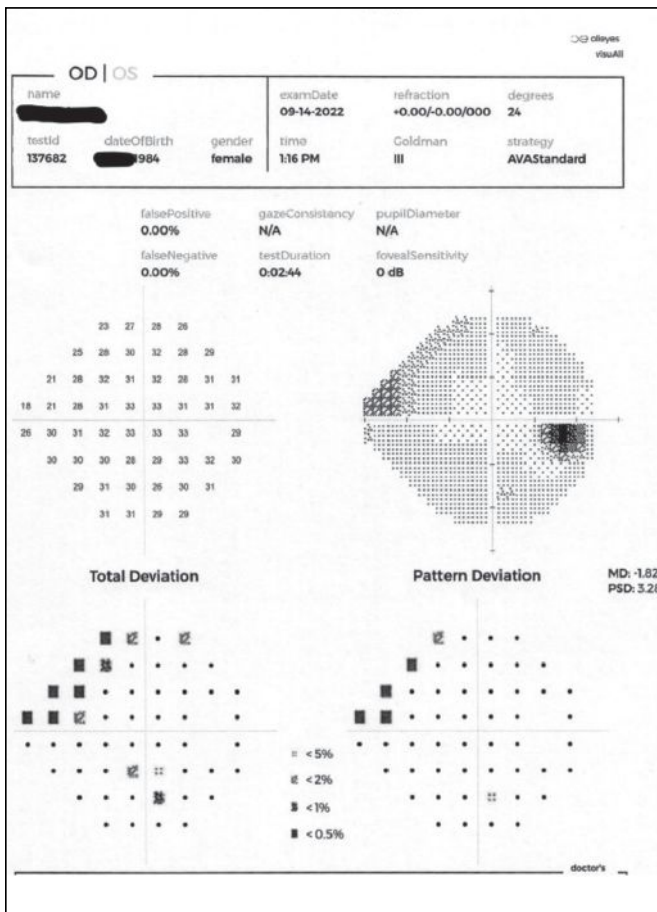
patient earlier this year, in September. Here's what I found.

Case

The patient was a 38-year-old Caucasian female who had been diagnosed with glaucoma earlier this year in both eyes, but it was her left eye that was of most concern. She had gotten

the impression that she would soon lose significant vision if the situation was not brought under control as soon as possible.

Her glaucoma medications included latanoprost HS OU, netarsudil QD OU and simbrinza BID OU. She reported that the netarsudil had been added most recently—a few months ago—and said she was told that she would be heading toward laser surgery in the left eye if it did not offer adequate control. Other than oral contraceptives, she was not taking any other medications. She reported good compliance with her drop regimen, and there was no evidence of medica-



The patient's right and left visual fields on presentation. Pre-dilation testing showed an early nasal step defect OD and a significant altitudinal defect involving fixation OS.

About Dr. Fanelli

Dr. Fanelli is the founder and director of the Cape Fear Eye Institute in Wilmington, NC. He is chairman of the EyeSki Optometric Conference and the CE in Italy/Europe Conference. He is an adjunct faculty member of PCO, Western U. and UAB School of Optometry. He is on advisory boards for Heidelberg Engineering and Glaukos.

tion intolerance. She had no allergies to medications but reported a family history of glaucoma in her father and maternal grandfather.

Her entering visual acuities were 20/20 OD and 20/30- OS through minimally myopic spectacles. Pinhole acuities slightly improved to 20/30+ OS. Her pupils were ERRLA with no afferent defect, and her extraocular muscles were full in all positions of gaze.

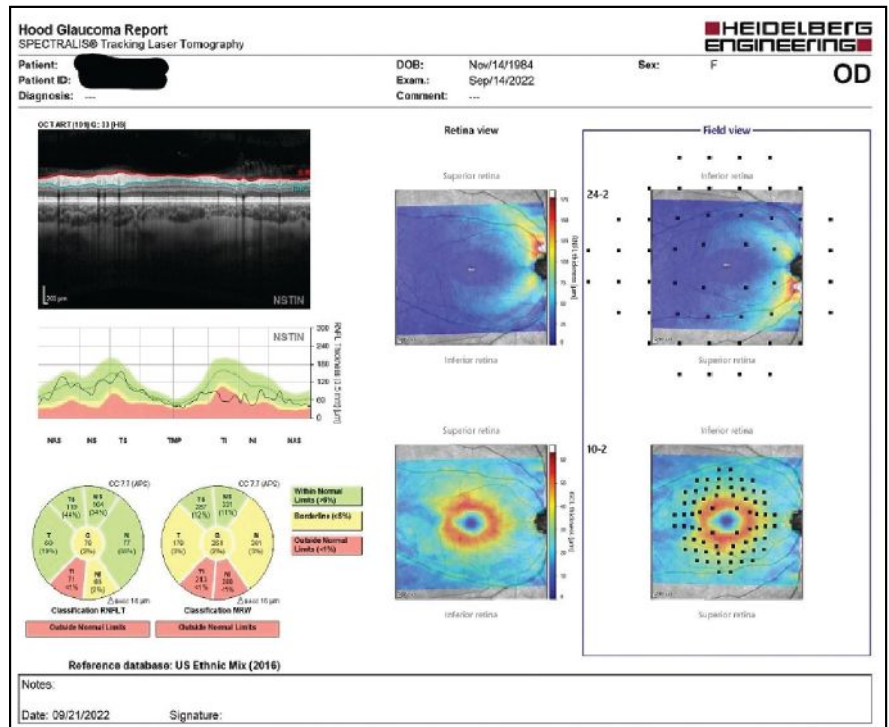
A slit lamp exam of the anterior segment was unremarkable. The patient's angles were wide open by Van Herick estimation. Her applanation pressures were 16mm Hg OD and 17mm Hg OS. Pachymetry readings were 552µm OD and 560µm OS.

Prior to dilation, threshold 24-2 visual field testing showed an early nasal step defect OD and a significant altitudinal defect involving fixation OS.

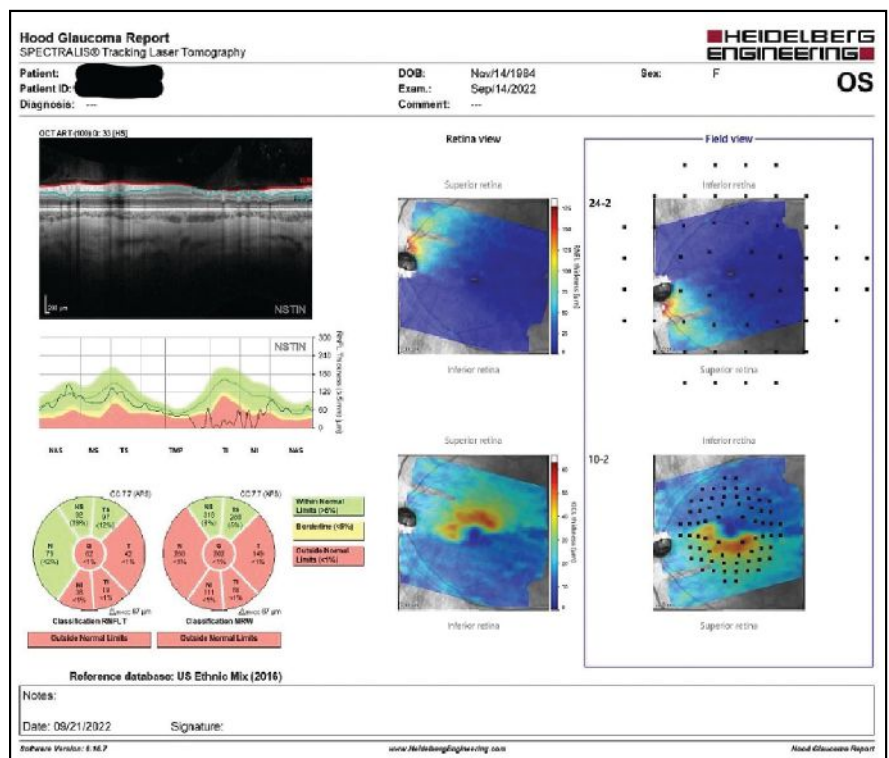
On dilated fundus examination, the patient's crystalline lenses were clear. Her cup-to-disc ratio was 0.50x0.50 OD, with the left disc too difficult to assess because it was a significantly obliquely inserted disc. The neuroretinal rim in the right eye at the slit lamp was plush and well perfused; that of the left demonstrated a very thin inferior neuroretinal rim from three to nine o'clock, owing to the extremely vertically inserted anatomy. The retinal vasculature was normal OU, as were the maculae, though there was no foveal reflex OS. The peripheral retinal evaluation was normal.

Once dilated, OCT imaging of both optic nerves and maculae was obtained. In particular, I was interested in all three regions where glaucomatous damage may be evident: at the BMO-MRW indices (neuroretinal rim), the peripoptic RNFL and the macula.

Imaging supported the *in vivo* slit lamp results. In the right eye specifically, there were some expected findings and a couple that raised concern for early glaucoma. Normal was the macular ganglion



On the lower left of the Hood report, note the Garway-Heath sector aberrations in both the RNFL and MRW readings inferotemporally. The RNFL defects are also seen on the NSTIN graph in the middle left of the image. Additionally, there is a wedge defect in the RNFL map in the central column top image under the retina view. Note too the relatively normal ganglion cell map in the lower portion centrally of the image under the retina view.



Note in the field view, to the far right in the image, the retinal thinning seen in the tilted disc on the left coincides nicely with the superimposed visual field test points, which in turn match perfectly with the results seen in the visual field study.

cell thickness. Abnormal was a small RNFL inferior arcuate defect that extended to the optic nerve, which also showed BMO-MRW thinning inferotemporally. These structural defects coincided with the early nasal step seen in the right field.

OCT of the left eye was notable for several reasons. The first was the paucity of retinal tissue seen in the retinal views of both the RNFL and the macular ganglion cell layers inferiorly. This is related to the obliquely inserted nerve and inferior hypoplastic tissue in the nerve and retina coinciding with the significant field defect in the left eye. Likewise, on the RNFL and MRW scans, there was significant absence of robust neuroretinal rim and RNFL tissue inferiorly in the right nerve. These findings are consistent with tilted disc syndrome. The loss of retinal tissue and consequently RNFL and neuroretinal rim tissue covers a large portion of the inferior anatomy of the retina and optic nerve and involves fixation.

Discussion

Tilted disc syndrome is congenital. Typically, the superior visual field is involved, and visual acuities may be affected depending on the severity of the angle of approach and insertion of the optic nerve to the sclera. Tilted disc syndrome is most commonly found in highly myopic eyes, and visual field progression often occurs in these patients.¹ Our patient was a low myope of -1.50D spherical equivalence.

Interestingly, it has been suggested that patients with tilted disc syndrome may actually have a lower likelihood of progressive glaucomatous damage, which may not come as too much of a surprise due to the relationship between myopia and glaucoma.²

There are many situations that mimic glaucoma both structurally and functionally, and tilted disc syndrome is one of them. So the obvious question here is this: since there are significant structural and functional



Note the inferiorly inserted approach of the optic nerve OS, as well as peripapillary atrophy visible inferiorly. In particular, note especially the significantly thin, colobomatous lack of tissue of the neuroretinal rim seen in the five o'clock representative image. The severe angle of insertion of the left optic nerve can be appreciated on the BMO-MRW printout of the left eye.

changes seen in the left eye, is this a case of mistaken identity? In other words, are we not looking at glaucoma but simply the effects of a tilted disc?

Well, there is no doubt that the tilted disc in the left eye plays a role in interpreting the clinical findings; however, the right optic nerve has absolutely no clinical appearance of a tilted disc but does have clinical findings associated with early glaucoma. While I would concur that there is early evidence of glaucoma in the right eye, it is hard to determine how much damage in the left eye is attributable to glaucoma vs. the tilted disc.

However, from a practical perspective, since the tilted disc is rather significant, I would assume at this point that the significant structural change is associated with the tilted disc, with perhaps some damage due to glaucoma. Given the fact that the right eye shows glaucomatous damage in the early stage in a patient with a

family history of glaucoma, I'd also assume the left will eventually follow on the same path.

While I do think the patient is currently overmedicated topically for glaucoma, I chose to not change any medications at this point, obtain her previous records to ascertain any notable changes that happened previously to warrant a ratcheting up of her medication regimen and reassess her OCTs in six weeks. If they are stable at the follow-up, we'll begin a slow reduction in her medication regimen to a level where we can keep her on the fewest number of drugs while at the same time making sure the glaucoma does not progress to more severe stages. ■

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SURGICAL MINUTE

Peel it Back

Foveoschisis requires surgical intervention. Here's what the MD will do to alleviate traction and protect the retina.

BY MICHAL REYGAN MARTIN, OD
AUSTIN, TX

Foveoschisis due to myopic traction maculopathy is recognized as the splitting of the inner retinal layers at the macula in patients with high myopia and posterior staphyloma. The pathogenesis is thought to be multifactorial, involving anterior traction, rigidity of the internal limiting membrane (ILM) and progression of the posterior staphyloma. Patients tend to be asymptomatic initially, but central vision loss slowly progresses over time with the formation of foveal detachment and/or macular hole.¹ They are often unaware they have foveoschisis due to the condition's slowly progressive nature, but this gives indication for surgical intervention.

OCT is the main diagnostic tool for confirming the presence of foveoschisis, as it focuses on the presence of epiretinal membrane, retinal thickening, vitreomacular traction, separation of neurosensory retinal tissue in two or more layers, retinal detachment lamellar or full-thickness macular holes.^{1,2}

Once OCT confirms foveoschisis, it's time to plan for surgery—pars plana vitrectomy with membrane peel.

The Procedure

In vitrectomy with membrane peel procedures, the instruments are usu-

For a video of the procedure, read this article online at www.reviewofoptometry.com.

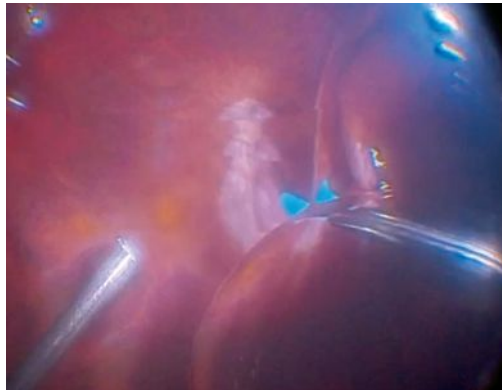


Photo: Alan Franklin, MD

An ILM peel in an eye presenting with foveoschisis and poster staphyloma.

ally inserted 4mm behind the limbus.³ The surgery, typically performed in an outpatient center, takes about 45 minutes. It is conducted under local anesthesia with very small incision ports that do not require suturing.³ Visual recovery varies from patient to patient, but can be dramatic the next day.³

Pre-retinal tissue is removed from the superficial inner retina with a 25-gauge sharkskin forceps. The procedure demonstrates a large diameter peel that borders the edge of the staphyloma. Brilliant blue or indocyanine green dye is used to stain the ILM and enhance structural identification. Following the membrane peel, a diluted gas tamponade is put in place for structural integrity.

In the video, which can be viewed online, the surgeon explains how unforgiving and delicate the retina is underneath the membrane, and stresses the importance of gentle removal of the tissue to avoid iatrogenic tears or

holes. These are typically some of the more challenging cases, due to the thin retinal tissue in highly myopic patients.

Treatment

Pars plana vitrectomy along with ILM peeling has shown good results in relieving traction on the macula and reducing recurrence by removing the scaffold for the proliferation of glial cells.¹ Peeling the ILM can cause iatrogenic macular holes, which may lead some surgeons to prefer another means of treatment.⁴ It is important that the surgeon identifies the directionality of the tractional force on the retina, taking into account both forces tangential or perpendicular to the plane of the retina and choosing a treatment option that mitigates that force.¹

The most common surgical complications include infection (roughly one in 1,000 procedures), retinal detachment (roughly one in 100 procedures), cataract progression in phakic eyes, bleeding and diplopia.³

The goal of surgery is to relieve abnormal traction of the vitreous and to tamponade the posterior retina to the protruding staphyloma. Currently, this is the most favorable surgical treatment, but new techniques and approaches will continue to evolve. ■

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LIVE COPE*





In Deep Trouble?

Problems that arise beneath the RPE are often worrisome. Would you recommend immediate attention in this case?

A 68-year-old Caucasian male presented to the eye clinic for a comprehensive eye exam with a complaint of blur while reading. He explained that he liked to wear

separate distance and near vision glasses and was hoping we could improve things. He denied any personal or family history of glaucoma or macular degeneration. His systemic history was

remarkable for sleep apnea, chronic obstructive pulmonary disease, gastroesophageal reflux disease and hepatitis C, all of which he was properly medicated for. He reported allergy to penicillin and codeine.

Clinical Findings

His best-corrected entering visual acuity was 20/20 OD and 20/25 OS at distance and near through +1.00/+2.25 spectacles. External testing was unremarkable, with normal confrontation fields and no afferent pupillary defect. Near vision was improved with a +2.75D addition. Anterior segment evaluation was normal and Goldmann applanation tonometry measured 15mm Hg OD and 14mm Hg OS. The pertinent fundus findings are demonstrated in the photograph.

Additional studies in this case might include B-scan ultrasonography to rule out mass lesions or detachments, fluorescein angiography to assess retinal circulation and a retina referral for treatment considerations.

Your Diagnosis

What would be your diagnosis in this case? What is the patient's likely prognosis? To find out, please read the online version of this article at www.reviewofoptometry.com. ■

Dr. Gurwood thanks Saidriya Komma, OD, for contributing this case. She is an attending optometrist and externship coordinator at the Kernersville VA Medical Center. She has no financial disclosures.



Does the appearance of the patient's peripheral fundus bring to mind any potential diagnoses?

About Dr. Gurwood Dr. Gurwood is a professor of clinical sciences at The Eye Institute of the Pennsylvania College of Optometry at Salus University. He is a co-chief of Primary Care Suite 3. He is attending medical staff in the department of ophthalmology at Albert Einstein Medical Center, Philadelphia. He has no financial interests to disclose.



NEXT MONTH IN THE MAG

In January, we present an issue devoted to the role of OCT in optometric practice. Articles will include:

- An OCT Buyer's Guide: Make the Right Purchase for Your Practice
- Using OCT to Diagnose and Follow Glaucoma
- How OCT is Indispensable in AMD, DR and Other Retinal Conditions
- Answer These Neuro Questions with One Quick OCT Scan
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Also in this issue:

- Understanding the Mechanisms of Myopia



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