Treating, eliminating negative dysphotopsia

by Vanessa Caceres EyeWorld Contributing Writer

AT A GLANCE

- Negative dysphotopsia can occur after cataract surgery, even if the surgery was perfect.
- Surgeons cannot predict who will experience negative dysphotopsia.
- It's best to observe patients for a few months before providing treatment, as many cases will resolve on their own.
- Treatment options include Nd:YAG laser capsulectomy, a piggyback lens, and lens exchange.

Treatments linked to suspected causes; prevention remains under investigation

The best way to treat negative dysphotopsia remains a hot topic among surgeons. Negative dysphotopsia that occurs right after cataract surgery is usually best left to resolve on its own. However, if the problem continues a few months after surgery, ophthalmologists must step in to provide a treatment. Their treatment approach usually depends on what they suspect is the cause.

Looking at causes

Negative dysphotopsia appears in patients as a temporal crescent-shaped shadow after in-the-bag IOL implantation following cataract surgery. It was first reported in 2000 by **James Davison, MD**, cataract and refractive specialist, Wolfe Eye Clinic, with locations throughout Iowa.[1] Dr. Davison said he observed the phenomenon with acrylic square-edge IOLs, which were introduced in the 1990s as a way to prevent posterior capsule opacification.

"There's controversy with the exact mechanism of action," said **David V. Folden, MD**, North Suburban Eye Specialists, Minneapolis. "I think more physicians and data would support the fact that it's ultimately the sharp posterior optic edge design of the modern-day IOL that's likely the culprit."

Other suggested factors include an IOL's high index of refraction, transparency of the peripheral nasal capsule, and type of incision used during surgery.

The immediate postop incidence for negative dysphotopsia appears to be around 20%, said **Samuel Masket, MD**, in private practice in Los Angeles, and clinical professor of ophthalmology, Jules Stein Eye Institute, David Geffen School of Medicine, University of California, Los Angeles. However, long-term chronic dysphotopsia complaints are closer to 1.5% to 3%, Dr. Masket said.

Surgeons cannot yet predict who will experience negative dysphotopsia, said **Jack T. Holladay, MD**, clinical professor of ophthalmology, Baylor College of Medicine, Houston.

Dr. Holladay wrote an article in 2011 that used ray tracing diagrams to explain negative dysphotopsia.[2]

"The peripheral arcuate shadow that patients see is the result of square-edge optics causing a refraction of the rays that pass through the edge of the lens that go in opposite directions (leaving a blind spot), and that creates a shadow. That always happens. If that shadow falls anterior to the functional retina, then you can't see it. If it falls on the functional retina then you'll see it," he said.

"Not everyone's peripheral retina is at the same point. People who have a functional retina extending far anteriorly will have a higher chance of experiencing this than people who don't," Dr. Holladay said. "We have no clinical way of determining how far a patient's functional retina goes." However, Dr. Holladay added that if someone experiences negative dysphotopsia in one eye, it's more likely that he or she will experience it in the fellow eye as well.

Available treatments for negative dysphotopsias

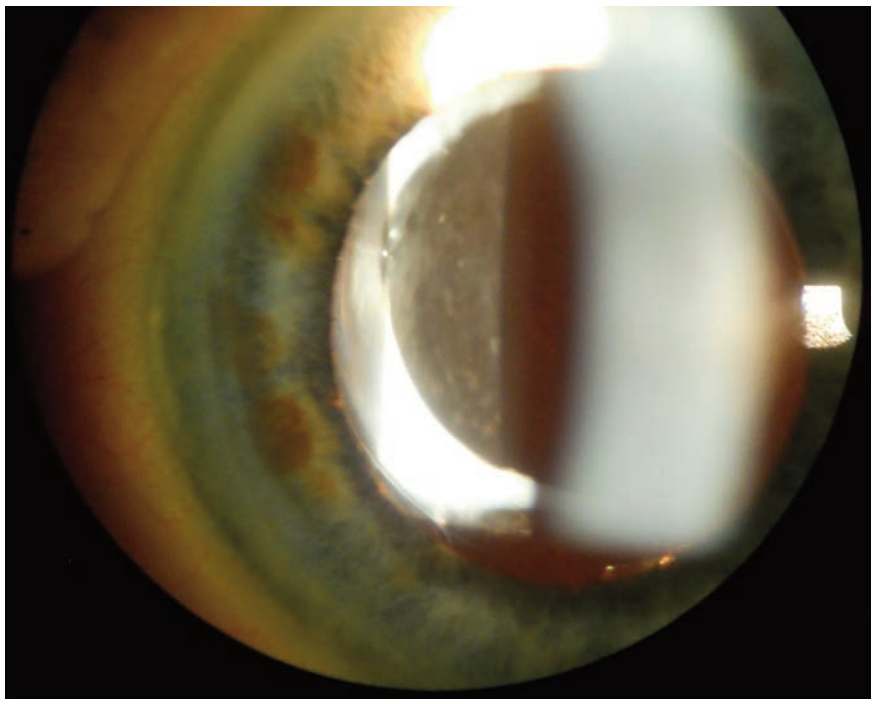
The first recommended treatment for negative dysphotopsia is observation. "Observation is a great first step. Ultimately, we think the capsule peripheral to the optic edge on the nasal side clouds over time, increasing light scatter into that shadow, and that eliminates the negative dysphotopsia," Dr. Folden said.

If the patient still has the problem 3 to 4 months later, the use of thick-framed glasses or a trial dilation can take place, Dr. Folden said. However, not many patients want to use thicker frames, and dilation is good for diagnosis but not for treatment, he cautioned.

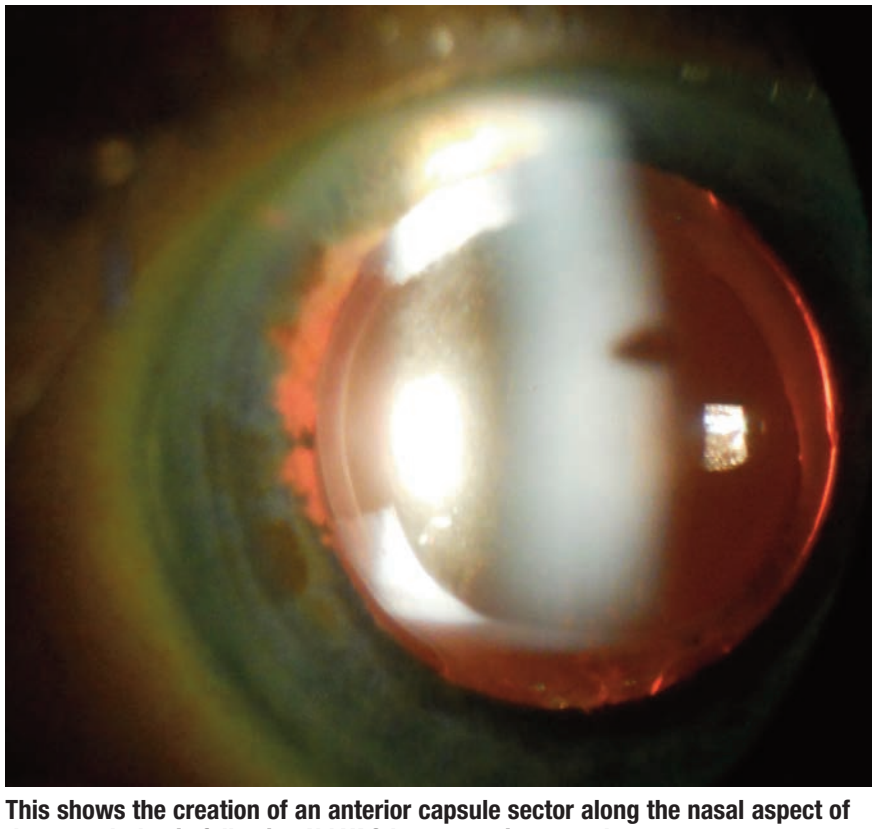
Even if patients must wait a few months before treatment, Dr. Masket reassures them what they are experiencing is a legitimate—and bothersome—visual phenomenon.

A treatment approach published recently by Dr. Folden in one report and **David L. Cooke, MD**,

continued on page 40



Slit lamp image shows the nasal anterior capsule overlying the anterior surface of the IOL optic prior to Nd:YAG laser anterior capsulectomy.



This shows the creation of an anterior capsule sector along the nasal aspect of the capsulorhexis following Nd:YAG laser anterior capsulectomy.

Source (all): David Folden, MD; *J Cataract Refract Surg.* 2013;39:1110–1115

PROVEN

OVER 15 MILLION PROCEDURES AND COUNTING

Helping you take more of your patients beyond 20/20*

iLASIK

Only ***iLASIK*** Technology provides truly customized treatments to help you take more of your patients beyond 20/20. Scan this code or visit **www.amo-ilasik.com/proven** to learn how to bring proven technology, that's good enough for NASA, to your patients.

*20/16 results delivered with excimer laser, clinical studies send to FDA via P930016 supplement 021.

Laser assisted *in-situ* keratomileusis (LASIK) can only be performed by a trained ophthalmologist and for specified reduction or elimination of myopia, hyperopia, and astigmatism as indicated within the product labeling. Laser refractive surgery is contraindicated for patients: a) with collagen vascular, autoimmune, or immunodeficiency diseases; b) who are pregnant or nursing women; c) with signs of keratoconus or abnormal corneal topography; d) who are taking one or both of the following medications: Isotretinoin (Accutane) and Amiodarone hydrochloride (Cordarone). Potential side effects to laser refractive surgery may include glare, dry eye, as well as other visual anomalies. LASIK requires the use of a microkeratome that cuts a flap on the surface of the cornea, potential side effects may include flap related complications. Patients are requested to consult with their eye care professional and *Patient Information Booklet* regarding the potential risks and benefits for laser refractive surgery, results may vary for each individual patient.

Restricted Device: U.S. Federal Law restricts this device to sale, distribution, and use by or on the order of a physician or other licensed eye care practitioner. U.S. Federal Law restricts the use of this device to practitioners who have been trained in its calibration and operation and who have experience in the surgical treatment and management of refractive errors.

Please see brief statement on adjacent page.

Abbott
Medical Optics

Treating continued from page 38

Great Lakes Eye Care, St. Joseph, Mich., in a separate report is the use of a neodymium (Nd):YAG laser anterior capsulectomy.[3,4]

Dr. Folden's study focused on six patients with negative dysphotopsia, five of whom had an Akreos AO M160 posterior chamber (PC) IOL (Bausch + Lomb, Rochester, N.Y.); symptoms completely resolved in three patients and partially resolved in the two others. In one patient who had an AcrySof IOL (Alcon, Fort Worth, Texas), symptoms did not go away.

"Because the anterior capsulectomy did not resolve the symptoms in the patient with the AcrySof IQ toric PC IOL, the anterior capsule should be considered an optical risk factor for negative dysphotopsia and important in the manifestation of symptoms in only some patients," Dr. Folden wrote. This approach is conservative, Dr. Folden said.

Dr. Cooke's report focused on negative dysphotopsia that was present in a patient 2 months after receiving a toric plate-haptic IOL that resolved after Nd:YAG removal of a portion of the nasal anterior capsule. The anterior capsule always has a certain degree of translucency and potential for light scatter even immediately following surgery. Light scatter that occurs through the anterior capsule may provide a route for light to reach the sharp posterior optic edge resulting in shadow creation. Although the capsule peripheral to the edge of the optic can help improve symptoms over time, the anterior capsule can contribute to symptoms, and if so, may respond well to Nd:YAG laser anterior capsulectomy.

"In our articles, Dr. Folden and I dramatically improved most cases of negative dysphotopsia with YAG anterior capsulectomy," Dr. Cooke said. He added that the patient who still had symptoms in Dr. Folden's report had a toric IOL where the haptics were oriented horizontally instead of vertically. However, Dr. Folden emphasizes that all patients in these two articles received IOLs that had either 360 degrees of sharp posterior optic edge or optic edge discontinuity (at the optic-haptic junction or as in the plate-haptic IOL), all capable of shadow creation regardless of orientation inside the eye. "Unfortunately, some mystery still remains on this topic," Dr. Cooke said.

Other possible treatments for negative dysphotopsia reported by Dr. Masket and **Nicole Fram, MD**, Los Angeles, have included the use of a piggyback IOL, a reverse optic capture procedure, and bag for sulcus IOL exchange.[5] Drs. Masket and Fram found piggyback IOL implantation and reverse optic capture were the most successful approaches in their study, leading to complete or partial symptom resolution by three months. These results led them to believe that symptoms depend on IOL coverage of the anterior capsule edge. Their study, which included UBM analyses, did not support the concept that increased posterior chamber depth was a causative factor for negative dysphotopsia. Another finding from Dr. Masket: "We've found that negative dysphotopsia can occur with any lens so long as it's in the capsular bag," he said.

Dr. Masket and **H. Burkhard Dick, MD**, chairman, University Eye Hospital Bochum, Germany, have tested the Masket Anti-Dysphotopic IOL (Morcher, Stuttgart, Germany) in Europe. The IOL allows for any haptic and edge design as well as toric and multifocal designs. The design features a groove on the anterior optic surface that captures the anterior capsulotomy and allows a portion of the optic to overlap the capsulorhexis. Dr. Masket has recently received a U.S. patent for the IOL design, which also received a CE mark last year. It's been used investigationally in five patients, none of whom have experienced negative dysphotopsia, Dr. Masket said. He believes that the IOL design, which mimics an aspect of reverse optic capture, will help patients avoid negative dysphotopsia.

Another IOL called the bag-in-the-lens IOL from **Marie-José Tassignon, MD**, Antwerp, Belgium, similarly prevents negative dysphotopsias. However, use of that lens involves the performance of a posterior capsulotomy, which many surgeons would prefer to avoid so as to not risk encountering vitreous, Dr. Holladay said.

The IOLs from Dr. Masket and Dr. Tassignon are under use or experimentation outside the U.S.

Lens exchange is yet another possible treatment. When Dr. Davison encounters negative dysphotopsia, he will remove the lens, put in a silicone rounded IOL, and perform an optic capture. He said he has tried using the Nd:YAG laser but it did not help, although he acknowledges that others have found success with it.

Although negative dysphotopsia does not occur often, Dr. Davison said surgeons still wish that they could find ways to prevent the problem. **EW**

continued on page 42

TREAT EARLY...

A SIMPLE CORNEAL SCAR IS ALL IT TAKES TO CHANGE AN OUTCOME

Treat early with PROKERA® SLIM, biologic corneal bandage, to reduce inflammation, promote healing and minimize the risk of scarring.

biotissue™

www.biotissue.com
8305 NW 27th Street, STE 101
Miami, FL 33173 – 888-296-8858

NEW PROKERA® | Slim

The sooner the better.

Call 888-296-8858 | or visit www.prokerainfo.com

Managing multifocal IOL dysphotopsia

by Ellen Stodola EyeWorld Staff Writer

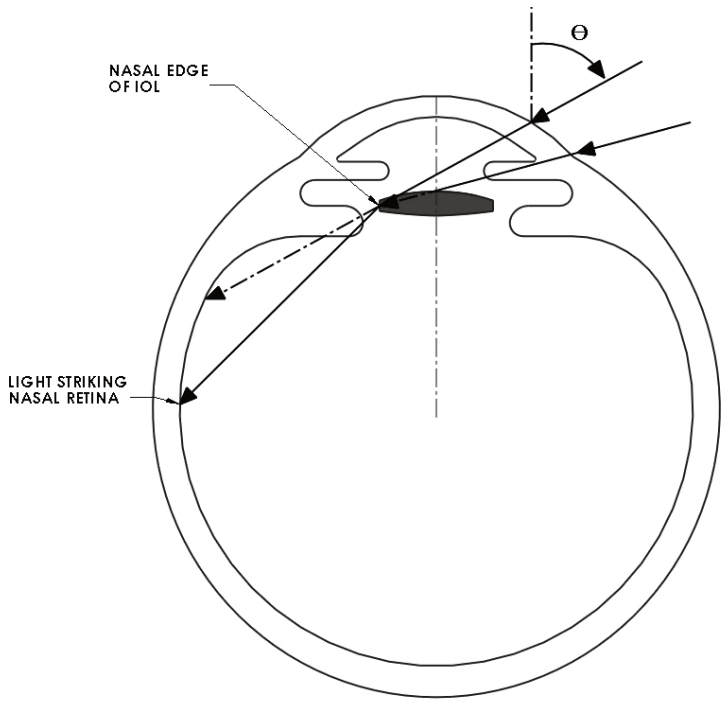
AT A GLANCE

- Dysphotopsias can occur with all types of IOLs but may be more common with multifocals.
- Many adapt to dysphotopsias, but in severe cases, a lens exchange may need to be performed.
- Choosing the right candidate for a multifocal at the onset is important.

Dysphotopsias can be a potential problem after surgery, especially with multifocal IOLs

One issue for patients receiving multifocal IOL implants is the potential for dysphotopsias, which can be bothersome and sometimes affect vision. **Richard Tipperman, MD**, Wills Eye Hospital, Philadelphia; **John Berdahl, MD**, Vance Thompson Vision, Sioux Falls, S.D.; **Audrey Talley Rostov, MD**, cornea, cataract, and refractive surgeon and partner, Northwest Eye Surgeons, Seattle; and **Douglas Katsev, MD**, Sansum Clinic, Santa Barbara, Calif., commented on dysphotopsias and how to address them in multifocal IOL patients.

Treating continued from page 40



Patients may complain of an arc image, usually in one quadrant, that bothers them. It is usually described after many of the square-edge optic lenses are placed in the bag. The image is depicted by the drawing of the light rays hitting the square edge of the optic.
Source: Doug Katsev, MD

Characterizing dysphotopsias

"One of the things you want to do is characterize them as positive dysphotopsias or negative dysphotopsias," Dr. Berdahl said. "Positive dysphotopsias are things like glare, halos—something that you see. A negative dysphotopsia is more like a shadow, something you're missing that you feel like you should see."

He said that negative dysphotopsias can occur with any type of lens, but positive dysphotopsias are more common with multifocal IOLs.

Dr. Talley Rostov said that dysphotopsias can occur with both multifocal and monofocal IOLs. "What's more troublesome are the dysphotopsias of the typical glare and halos, especially with the multifocal IOLs," she said. In a small number of patients, these can be so disabling that the physician needs to do a lens exchange.

Typically, dysphotopsias from multifocal IOLs are circles or rings around light, Dr. Tipperman said. It is important when evaluating patients to get a clear description of what they are seeing. He said patients oftentimes come in with pictures or drawings to illustrate. "Until you can understand it and categorize it, you can't even begin to treat it," he said.

Causes

Dr. Katsev said dysphotopsias are light rays that are altered to create an image that falls incorrectly on the retina, and this alteration causes visual complaints in some patients. "They are often caused by the edge of the lens, imperfections in the lens, as well as the diffractive or refractive aspect of the multifocal lens," he said. "As for the premium IOLs, a zonal refractive lens will result in the most complaints, especially early in the recovery process."

"Dysphotopsias may be permanent but always soften with time," Dr. Katsev said. "Most often they decrease to a very tolerable level and may even go away."

Dr. Berdahl said that when using a multifocal IOL, it's important for the optical system to be pristine. "A multifocal IOL splits light and therefore decreases contrast sensitivity," he said. "Anytime there is a change in a structure at the interface then there's an opportunity for light to be scattered. Multifocal IOLs purposely have changes in them, the rings that are on the IOLs, and when the light hits, it can be scattered, leading to glare or halos. So part of it is the IOL itself," he said. "The second part of it is that light is traveling through a more complex optical system in general." Therefore, if there is some light scatter from an irregular cornea, anterior basement membrane dystrophy, or another condition, this light scatter can reach an intolerable point when paired with a multifocal IOL.

"Part of it is choosing the right candidate for a multifocal IOL at the onset," Dr. Talley Rostov said. It's important to ask about the patient's occupation. If the patient will be doing a lot of night driving, he or she might not be the best candidate for a multifocal IOL. It's important to look for uncorrected astigmatism preoperatively as well as any refractive error because they could contribute to dysphotopsias.

"The other thing to look for is any dry eye. Make sure that the ocular surface is healthy because the first thing that we get to is the tear layer when we're looking at how light is refracted by the eye, so any ocular surface disease can certainly be problematic for the patient. If there is ocular surface disease, that needs to be adequately treated because it can either change the refraction and/or cause some dysphotopsia," Dr. Talley Rostov said.

Counseling patients

Dr. Berdahl explains to his patients that multifocal IOLs are the best technology to make them spectacle

References
1. Davison JA. Positive and negative dysphotopsias in patients with acrylic intraocular lenses. *J Cataract Refract Surg*. 2000;26:1346-1355.
2. Holladay JT, Zhao H, Reisin CR. Negative dysphotopsias: The enigmatic penumbra. *J Cataract Refract Surg*. 2012;38:1251-1265.
3. Folden DV. Neodymium:YAG laser anterior capsulectomy: Surgical option in the management of negative dysphotopsia. *J Cataract Refract Surg*. 2013;39:1110-1115.
4. Cooke DL, Kasko S, Platt LO. Resolution of negative dysphotopsia after laser anterior capsulotomy. *J Cataract Refract Surg*. 2013; 39:1107-1109.
5. Masket S, Fram N. Pseudophakic negative dysphotopsia: Surgical management and new theory of etiology. *J Cataract Refract Surg*. 2011;37:1199-1207.

Editors' note: Dr. Holladay has financial interests with the Holladay IOL Consultant, Abbott Medical Optics (Santa Ana, Calif.), and WaveTec Vision (Aliso Viejo, Calif.). Dr. Masket designed the Masket Anti-Dysphotopic IOL mentioned in the article. He has financial interests with Alcon (Fort Worth, Texas). The other physicians interviewed have no financial interests related to their comments.

Contact information
Cooke: davidlcooke@gmail.com
Davison: jdavison@wolfeclinic.com
Folden: foldav@gmail.com
Holladay: docholladay@docholladay.com
Masket: avcmasket@aol.com