

Why and How to Evaluate Cognitive Problems in Ophthalmology Patients

For decades, ophthalmologists have noticed the interplay between vision and cognitive function in their patients. Recently, several articles have been published on the topic, including two longitudinal studies that point to an association between visual impairment and dementia. They showed that poorer visual acuity was often a predictor of higher dementia incidence over time.^{1,2}

With dementia on the rise (see “The Rising Burden of Dementia,” next page), there is an urgent need to recognize cognitive impairment. In fact, early detection is one of the declared goals of the National Alzheimer’s Project Act.³ Once cognitive issues are identified, patients and their health care providers may be able to develop a plan for managing the condition.

Ophthalmologists are well positioned to identify patients who may have cognitive issues, said Suzann Pershing, MD, at Stanford School of Medicine and the VA Palo Alto Health Care System in Palo Alto, California. However, because there are no evidence-based guidelines for ophthalmologists who want to integrate this type of screening into their exams, those who do take various approaches.

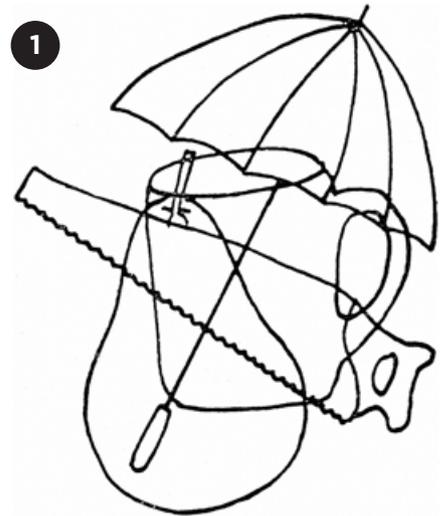
Vision/Cognition Connection

The relationship between the eyes and the brain is closely interwoven.

Direct connection. Even if the

eyes are healthy, the brain must be able to process and interpret the images correctly for successful vision, said Victoria S. Pelak, MD, at the University of Colorado School of Medicine in Denver, who specializes in assessing and treating patients with visual problems related to neurological diseases. Conversely, it is theorized that visual stimuli are necessary to maintain healthy brain function, she said, which may be why multiple studies have found that visual impairment is correlated with development of cognitive problems over time.

Cognitive and visual impairment often coexist, said Dr. Pershing, pointing to robust evidence from multiple sources linking the two. (See “Further Reading,” with this article at aao.org/eyenet.) However, she noted, “It is hard to determine causality. Most likely the relationship is bidirectional: On one hand, cognitive impairment may lead to central visual impairment via the brain’s reduced ability to process and interpret images. On the other, low vision may lead to cognitive impairment. The latter may occur via several possible pathways, such as increased demands on the brain for processing lower-quality visual input, which would strain already stressed cognitive resources. Another pathway might involve a ‘common cause’—that is, structural and functional central nervous system aging changes that are



OVERLAPPING FIGURES. Images such as this may one day be used to screen for cognitive impairment.

at the root of cognitive and/or visual impairment.” Further complicating matters, general confounders such as age, sex, education, and cardiovascular risk factors may also affect both visual and cognitive impairment, she noted.

Dr. Pershing coauthored a study last year using Women’s Health Initiative study data that included formal vision and cognitive assessment. The results showed that women with baseline visual impairment had a higher likelihood of developing later dementia, in a dose-response relationship where worse baseline vision was associated with increasing hazard of developing dementia.² To further support this finding, she said, “We have also demonstrated with nationally-representative survey data that patients who have visual impairment had a more than

BY KATHRYN MCKENZIE, CONTRIBUTING WRITER, INTERVIEWING VICTORIA S. PELAK, MD, SUZANN PERSHING, MD, AND BRIAN C. STAGG, MD.

twofold likelihood of developing cognitive impairment, and vice versa,”⁴ Dr. Pershing said.

Indirect connection. Indirect vision-related factors may also affect cognition, said Dr. Pelak. For instance, lack of social contact is a risk factor for developing dementia. Poor vision might be related to this, as a person who has trouble seeing may be less likely to socialize because he or she can't recognize faces or cannot drive to activities that would provide social stimulation, she said.

Visual manifestations of various conditions. Interestingly, some neurological conditions may show themselves first as vision problems. For example, a visual variant of Alzheimer disease known as posterior cortical atrophy, which can also be caused by Lewy body dementia, is often initially revealed in the patient's struggle to read or an inability to recognize familiar objects.⁵

Ophthalmologists' Role

Ophthalmologists are well positioned to screen patients for cognitive impairment, despite challenges.

Screening challenges. “Patients with dementia are almost half as likely [as those without dementia] to see an ophthalmologist,” said Dr. Pershing. What's more, cognitive impairment is especially difficult to pick up on in a short eye clinic office visit, she said. The good news is that “ophthalmologists often develop long-standing relationships with patients and may notice changes over time.”

Formal screening tests. Physicians may consider performing mini-tests along with the eye exam to gauge cognition. Dr. Pershing said that most ophthalmologists have probably heard of the basic Mini Mental State Examination (MMSE), but she noted that it relies on reasonably good vision since there is a visual component to the test. There are numerous other tests, such as the Montreal Cognitive Assessment (MoCA) and the St. Louis University Mental Status (SLUMS) exam, but they require time and familiarity to administer, she said.

Brian C. Stagg, MD, at the Moran Eye Center at the University of Utah

The Rising Burden of Dementia

Dementia is on the rise in the United States. In addition, the cost of care for dementia patients is increasing, with total payments for health care, long-term care, and hospice services in the United States estimated by 2050 to reach \$1.1 trillion.¹ Worldwide, dementia is predicted to affect more than 140 million people by 2050.²

Ophthalmologists can help. A systematic meta-analysis of data from more than 6 million individuals, published in *Ophthalmology* last year, concluded that “. . . vision impairment is associated with an increased risk of both dementia and cognitive impairment in older adults. Vision impairment is an important modifiable contributor to dementia, and screening and treating vision impairment . . . may help to alleviate the global burden of dementia.”³

1 Gaugle J et al., for the Alzheimer Association. *Alzheimers Dement.* 2021;17(3):327-406.

2 Baumgart M et al. *Alzheimers Dement.* 2015;11(6):718e726.

3 Xianwen Shang et al. *Ophthalmology.* 2021;128(8):1135-1149.

with a special interest in geriatric ophthalmology, suggests that ophthalmologists interested in conducting formal screening for dementia consider using the Mini-Cog test, which primary care physicians use. It takes three minutes and consists of recalling a brief word list and drawing a clock face.

However, Dr. Pelak pointed out that the topic of screening should be broached carefully. Patients may feel offended or challenged by questions about their brain function. Also, consent or discussion is recommended before a formal screening is undertaken, she said. “It's a sensitive issue, and [screening] can scare people, and scare them away from help.”

Screening with images. Dr. Pelak is currently part of a team studying images that could be used for screening. These are not being developed specifically for ophthalmologists, but Dr. Pelak said it's possible that one or more of these could be included in an eye exam. “Our hope would be to include this on a visual acuity chart,” she said.

The images show overlapping figures of everyday objects. For instance, in one, the outlines of a pear, a handsaw, a mug, and an umbrella are laid on top of each other (Fig. 1), and the observer is called on to identify each one. If a patient has trouble with this, it's an indication that something could be amiss in brain function, she said.

A less formal method. Careful

observation of the patient over time also can be helpful in detecting neurological issues, said Dr. Stagg. Asking questions and getting a sense of how the patient is doing in day-to-day life can help ophthalmologists judge if further referrals need to be made regarding cognitive function, he said. “I talk to patients specifically about the medications they're using, ask them about how their day is going, what they've done today, and if anything new is going on in their life,” he said. “I feel like I'm able to get a reasonable picture of how the patient is and how their cognition is affecting their care.”

Signs of cognitive impairment. Memory impairment is often an early sign of dementia, said Dr. Pershing. Patients may be more easily frustrated or appear depressed, irritable, anxious, or apathetic. In addition, they may have increased forgetfulness regarding medications or eyedrop regimen, or they may give vague responses to pointed questions. “Reliable family members can also be a key resource,” said Dr. Pershing. And context about the patient's living situation and support network can also provide information, she noted.

Primary care connection. Staying in touch with the patient's primary care physician should be a top priority when cognitive impairment is suspected—and even when it's not, Dr. Stagg said. “I think it is really important for all

of us, as ophthalmologists, to connect with primary care doctors,” he said. He sends letters to primary care physicians, with the patient’s permission, and keeps the line of communication open.

Next Steps

If a cognitive problem is suspected, what should the ophthalmologist do?

Correcting vision issues. “Evidence suggests that visual impairment and eye disease are more likely to be unrecognized and untreated in patients with cognitive impairment,” said Dr. Pershing. Considering that visual impairment can contribute to dementia, it’s vital that ophthalmologists weigh treatments and alternatives for patients, said Dr. Stagg.

Optimizing vision to best meet the patient’s visual and eye care needs may be as simple as prescribing new lenses or performing cataract surgery, said Dr. Pershing. Dr. Stagg recalled one patient with “advanced dementia and very bad cataracts in both eyes. He came to clinic and was kind of disheveled and completely out of it.” Surgery resulted in

changes in the patient’s cognition and relationship to the world: “He came back for his post-op appointment and looked like a totally different person. He was very much more engaged.”

Referral. Referral to a low vision specialist may help to make the most of vision for people who do not have correctable issues, said Dr. Stagg. For those puzzling cases in which visual acuity is normal but there are problems recognizing words or figures, clinicians can refer patients to a neuro-ophthalmologist or reach out to the patient’s primary care physician to decide the best action to take, said Dr. Pelak.

Comorbidities. Dr. Stagg mentioned that the combination of vision and hearing loss may be particularly devastating for cognition.⁶ “People who have both vision and hearing impairment do worse than either one alone, and worse than you’d expect if you just added them together,” he said. “Especially as we age, optimizing our vision and our hearing is important for our cognition, for our social functioning, and our overall health.”

1 Lee ATC et al. *J Gerontol A Biol Sci Med Sci.* 2020;75(11):2162e2168.

2 Tran E et al. *JAMA Ophthalmol.* 2020;138(6):624-633.

3 <https://aspe.hhs.gov/sites/default/files/private/pdf/264206/NatlPlan2020.pdf>.

4 Chen SP et al. *Ophthalmology.* 2021;128(9):1276-1283.

5 Metzler-Baddeley C et al. *Neuropsychology.* 2010;24(1):35-48.

6 Lin MY et al. *J Am Geriatr Soc.* 2004;52(12):1996-2002.

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