

News in Review

COMMENTARY AND PERSPECTIVE

RETINA

Retinal Abnormalities and COVID

RETINAL MICROVASCULAR ABNORMALITIES and impaired blood flow appear to be emerging as signature ocular manifestations of COVID-19 infections, researchers have found.^{1,2} The abnormalities, which have been observed even in otherwise healthy eyes, support the hypothesis of widespread microvascular damage that could be clinically silent in those who have had COVID.²

Study in Singapore. In Singapore, a prospective study of 108 COVID-positive subjects found that 1 in 9 had retinal microvascular signs.¹ The abnormal findings included eight eyes (3.7%) with microhemorrhages, six (2.8%) with retinal vascular tortuosity, and two (0.93%) with cotton-wool spots. OCT scans revealed 11 eyes (5.1%) with hyper-reflective plaques in the ganglion cell-inner plexiform layer—and two of those eyes also had retinal signs visible on color fundus photographs.

Underlying cardiovascular impact? “These signs were observed even in asymptomatic patients with normal vital signs and no past history of cardiovascular disease. These retinal microvascular signs could represent underlying cardiovascular and thrombotic alterations associated with COVID-19 infection,” said Chee Wai Wong, MBBS, MMed(Ophth), at the Singapore National Eye Centre and the Duke-NUS Medical School.

Moreover, the scientists found that

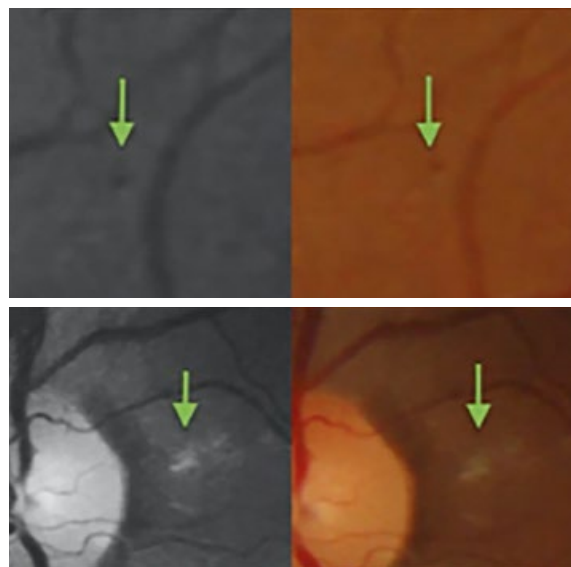
COVID patients with retinal signs were significantly more likely to have elevated blood pressure than were those without such signs ($p = .03$), Dr. Wong said. “Serial monitoring of these patients showed normalization of blood pressure as they recovered from COVID-19. Hence, there may be a role in triaging patients for eye screening based on serial monitoring of blood pressure,” he said.

Study in Italy. Italian researchers performed OCT and OCT angiography (OCTA) on the retinas of 40 patients who had recovered from SARS-CoV-2 pneumonia and compared them to 40 healthy control subjects.²

All of the post-COVID patients had normal ocular and fundus examinations, and none reported eye symptoms. Nonetheless, the OCTA images showed significant, diffuse perfusion loss in several areas of the post-COVID patients’ retinas, compared to controls, the researchers reported.

Alterations in retinal blood flow. The density of deep capillary vessels was reduced in all macular regions, as was vessel density in the superficial capillary plexus ($p = .038$) and the radial peripapillary capillaries ($p < .001$). Structural OCT showed lower average thickness of the retinal nerve fiber layer ($p = .012$), and this correlated significantly with the angiographic data.

Alterations in retinal blood flow



AFTER COVID. Retinal abnormalities, as seen on color fundus and red-free images, included (top) retinal microhemorrhages and (bottom) peripapillary cotton-wool spots (green arrows).

could reflect a variety of pathogenic mechanisms that have been linked to SARS-CoV-2 infection, including thromboinflammatory microangiopathy and angiotensin-converting enzyme 2 disruption, the authors said.

If the group’s findings are confirmed by larger studies, OCTA images might help physicians to better anticipate or prevent systemic deterioration in their COVID patients, the researchers wrote. “OCTA allows [physicians] to detect the signs of retinal thrombotic microangiopathy that could reflect the systemic vascular impairment occurring in multiorgan dysfunction. OCTA could represent a valid biomarker of systemic vascular dysfunction after SARS-CoV-2 infection.”
—Linda Roach

1 Sim R et al. *Br J Ophthalmol.* 2021;227:182-190.

2 Cennamo G et al. *Am J Ophthalmol.* Published online March 26, 2021.

Relevant financial disclosures—Dr. Wong: None.

GLAUCOMA

24-Hour Monitoring: IOP and Daily Activities

EMOTIONAL STRESS AND RESISTANCE training each caused a persistent rise in intraocular pressure (IOP) in open-angle glaucoma patients and glaucoma suspects, report researchers who used 24-hour telemetric monitoring to observe the effect of daily activities on IOP.¹ The researchers caution, however, against drawing firm clinical recommendations from this small, exploratory study.

“The important message this study conveys is that IOP is far from static,” said Kaweh Mansouri, MD, at Montchoisi Clinic in Lausanne, Switzerland. “IOP is highly dynamic and appears to be significantly affected by a wide range of day-to-day activities and lifestyle habits.”

First of its kind. At the University of California, San Diego, 41 patients were fitted in one eye with a Triggerfish contact lens sensor (CLS; Sensimed), which continuously records subtle fluctuations in ocular volume.

They were then instructed to return to their standard daily activities for a 24-hour period. This protocol was repeated twice.

During the 24-hour time periods, the participants recorded the start and end times of their activities. Baseline was defined as CLS measurements taken 30 to 60 minutes prior to each event. Then IOP-related fluctuations were observed for 120 minutes from the start of each event.

The study yielded 40 relevant events from 22 CLS recordings of 14 patients. The most surprising finding was the persistent effect of certain activities on IOP, Dr. Mansouri said.

IOP fluctuations by activity. Recorded events were divided into five types



MINIMAL IMPACT? IOP rose slightly during cycling and walking.

of activities by the researchers (other kinds of activity were disregarded):

- **Resistance training.** This caused a rise in IOP-related profile from the onset of training through 120 minutes after the person stopped lifting weights.

CATARACT

Endophthalmitis Tx After Cataract Surgery

A STUDY FROM THE NETHERLANDS SUPPORTS THE efficacy of intravitreal vancomycin and ceftazidime to treat acute endophthalmitis after cataract surgery.¹ “The findings strengthen the fact that current antibiotic treatment for endophthalmitis after cataract surgery is still effective, despite the slight change in cultured strains, specifically more gram-negative ones, compared to previous years,” said Niels Crama, MD, at Radboud University Medical Center in Nijmegen.

Dr. Crama warned, however, that the increased use of intracameral antibiotics at the end of surgery “may create a false sense of safety.” He also emphasized that surgical technique continues to play a critical role in endophthalmitis prophylaxis.

Retrospective series. For this study, researchers reviewed clinical and microbiology data of 126 patients who were referred to a tertiary center between 2007 and 2015 for acute endophthalmitis following unilateral cataract surgery.

Bacterial culprits. Bacterial growth occurred in 73% of cases. Coagulase-negative staphylococci was the most common strain (53.3%), followed by other gram-positive (31.5%) and gram-negative (14.1%) strains. Vancomycin was effective in nearly all (98.7%)

gram-positive strains, while ceftazidime proved 100% effective against gram-negative strains.

Outcomes. Two-thirds (67.5%) of the patients recovered to a visual acuity of 20/40 or better, while 15% had vision of hand motions to 20/50, and 17% had light perception or worse. The virulence of the causative bacteria was the main predictor of a poor visual outcome, which suggests that earlier treatment might have an impact on outcome.

Surgical factors still matter. A subgroup of patients (n = 25) developed endophthalmitis despite intracameral cefuroxime after surgery, highlighting the ongoing importance of surgical factors—particularly careful wound construction and closure—in preventing postoperative endophthalmitis. (In the Netherlands, intracameral cefuroxime is recommended in high-risk cases, although a growing number of clinics currently administer antibiotic prophylaxis after every cataract surgery.)

Complications during surgery occurred in 11 (44%) of those cases, including seven cases of capsular rupture. “We found in the literature that intracameral cefuroxime is only effective for the first few hours after injection in an intact anterior chamber,” Dr. Crama said. “This is even shorter for complicated surgery with leaking wounds.”

—Miriam Karmel

1 de Geus SJR et al. *Ophthalmol Retina*. 2021;5(6):503-510.

Relevant financial disclosures—Dr. Crama: None.

• **Emotional stress.** This was associated with a gradual elevation of the IOP-related profile from the start of the stressful stimulus; both early and late variations in IOP were statistically significant.

• **Walking/cycling.** This caused a small, but significant, elevation of the IOP-related profile during the activity, followed by a nonsignificant decrease.

• **Yoga/meditation.** This caused a sustained, but not significant, drop in the IOP-related profile through to 120 minutes.

• **Alcohol intake.** Consumption of alcohol was associated with an initial significant decrease in IOP. Subsequent variations were not significant.

Toward personalized care. “Recent studies have suggested IOP fluctuations may play an independent role in the pathophysiology of glaucoma,” said coauthor Kevin Gillmann, MD, also at Montchoisi Clinic.

“Acknowledging these out-of-clinic variations may be key to understanding the broader picture and to addressing patient-specific risk factors for glaucoma progression,” Dr. Gillman added.

—Miriam Karmel

1 Gillmann K et al. *Sci Rep.* 2021;11(1):6598.

Relevant financial disclosures—Dr. Gillmann: None. Dr. Mansouri: Sensimed: C.

MEDICAL EDUCATION

Socially Distanced Wet Lab Proves Effective

A REMOTELY MONITORED WET LAB

—created to teach microsurgical skills to residents during the COVID-19 lockdown—worked well enough to suggest that this model might be a widely applicable tool for ophthalmic education, researchers at the University of California, San Francisco (UCSF) reported.¹

How it works. The Zoom-based system consists of a laptop computer to visualize the resident’s hand and body positioning, a smartphone attached to a

standard operating microscope’s ocular with a smartphone camera adapter (Gosky Optics), and a large external monitor connected to the laptop. The latter enables the instructor to deliver information on a virtual whiteboard.

The multiple video images are then displayed side-by-side on the instructor’s home computer monitor.

Positive feedback. In a small prospective study, the researchers found that both the 10 residents and their three instructors rated the remote web lab as effective in teaching corneal suturing, and as equally or more effective compared to previous in-person wet labs. The setup allowed all features of the modified global rating scale of operative performance to be evaluated, the researchers said.

“From a teaching point of view, I was surprised at how effective this could be. And the fact that I could do this from my living room made me much more interested in and available for after-hours wet lab teaching,” said senior author Saras Ramanathan, MD.

Future applications. Dr. Ramanathan said she believes that remote sessions can never completely replace in-person instruction. However, the remote approach could augment ophthalmology residency programs in important ways, she said.

For residency programs. “Let’s say residents are about to go in to do their first corneal transplants, and they just want to make sure they do the suturing in the way their attending would like. This would be a great way to do one-on-one practice,” she said. “It’s an educational scaffold for those residents to learn the techniques that they will immediately be called upon



CREATIVE SOLUTION. The UCSF team developed the socially distanced wet lab after pandemic precautions eliminated conventional wet lab courses and curtailed surgeries.

to do at that next OR day.”

Remote wet labs also could benefit smaller training programs that have only one surgical microscope, because residents and instructors could schedule labs during off hours, Dr. Ramanathan said.

For those in practice. Similarly, a remote wet lab or other online tools might broaden the concept of continuing medical education for ophthalmologists already in practice, she said. “Zoom has made teleconferencing so second nature to all of us. I think there’s a lot of potential. We have to just think outside the box.”

Dr. Ramanathan added, “I wonder if we could do something like this to help ophthalmologists in private practice, in this country or in other countries, who are trying to learn new things and trying to get help from mentors who would otherwise be inaccessible. It seems reasonable to me that someday soon I could be here at my computer watching someone do surgery somewhere far away, and I could be helping them get through a case, just as I would help my resident in the OR.”

—Linda Roach

1 Pasricha ND et al. *J Cataract Refract Surg.* 2020; 46(12):1667-1673.

Relevant financial disclosures—Dr. Ramanathan: None.

MORE ONLINE. For additional images, see this article online at aao.org/eyenet.

See the financial disclosure key, page 8. For full disclosures, including category descriptions, view this News in Review at aao.org/eyenet.