

# Assuring Continuity of Retina Care During the COVID-19 Pandemic Using Multimodal Imaging

A specially designed teleconsulting protocol, coupled with expanded use of multimodal imaging, has ensured patients continue to have access to retina care at Hôpital Lariboisière.

**AUDE COUTURIER, MD, PHD; ALI ERGINAY, MD; AND RAMIN TADAYONI, MD, PHD**



The COVID-19 pandemic has presented many challenges for the delivery of health care services, affecting every sector of medicine. During this difficult time, patients are still experiencing health issues that require the careful focus and attention of medical experts. However, the requirement to minimize in-person visits has necessitated the invention and implementation of new strategies for patient-physician interactions. In the following, we describe a teleconsulting paradigm being utilized by Hôpital Lariboisière in Paris to ensure patients maintain access to services within our retina department.

## TELECONSULTATIONS AND EXPANDED TELEMEDICINE SERVICES

Like almost every health provider around the world, our center enacted a strict set of protocols to ensure the health of patients and providers in response to the emergence of SARS-CoV-2, the virus that causes COVID-19. In addition to the diligent use of personal protective equipment by staff and patients, the department is following a protocol with three main objectives. The first is to limit the exposure risk for the patients in our department, many of whom are elderly or immunocompromised, which has necessitated postponing non-urgent surgeries and delaying intravitreal injections in situations where vision will not be compromised. For patients being treated for diabetic macula edema or age-related macular degeneration with

anti-VEGF agents who were already on a treat-and-extend protocol, we maintain the last longest interval without accumulation of fluid on the macula. For others, we try to maintain fixed injection intervals with discretionary use of OCT to gather new images, with the latter functioning to shorten the visit. The second emphasis is to limit the amount of time patients spend in the department, including during discretionary parts of the appointment and time spent in waiting rooms. We have also expanded use of telemedicine and teleconsultation. The third is to avoid the risk of vision loss in our patients. All of these measures require cooperation from patients and mean that they have to participate even more in their own care.

The health care system of France has made extensive use of telemedicine to expand patients' access to services for over 20 years. Our institution is a designated reading center for images captured remotely as part of a diabetes screening program, serving approximately 15,000 patients a year. This service could be expanded to include other retinal pathologies as we respond to the COVID-19 pandemic.

Retina services are highly reliant on imaging for diagnosing disease and following pathology. Under our previous working conditions, patients would often spend extended periods of time moving from one imaging device to another, with time spent in various waiting rooms in between. During a visit, patients could be at the clinic for up to 2 hours prior to a physician-led consultation, as the visit would include both a complete retinal imaging and a full ophthalmologic examination by a retinal specialist. In the interest of shortening time in the clinic, we are following patients with

teleconsulting services in two ways. The first and largest group of patients, those already using our clinic or living in the surrounding area, visit a unit isolated from our main retina service for imaging on a multimodal platform (Mirante; NIDEK). This has three distinct benefits. First, having patients visit a dedicated unit helps maintain isolation from our regular flow of patients. Second, use of the Mirante, which is outfitted with OCT, color photography with various filtering modes, a full suite of angiography options including OCT-Angiography (OCT-A), and widefield capabilities, means that one platform can be used to capture almost any image or photograph necessary for the examination (Figure). Third, only one machine must be cleaned between each patient visit. The use of this system has reduced patients' time in the clinic to less than 30 minutes. This visit is only dedicated to visual acuity measurement, intraocular pressure measurement, and retinal imaging, and it can be performed either by a resident or a nurse. Then, the second part of the visit is a teleconsultation performed by a retinal specialist who has analyzed the data: the patient is contacted for a follow-up consultation with one of the unit specialists, which is conducted virtually.

The second way we are covering patients during the pandemic is by extending the diabetes screening program. For patients already under the care of one of our clinicians who live further away from Hôpital Lariboisière, or who are unable to travel to our site, we have implemented protocols for getting imaging and treatment locally that is directed by one of our retinal specialists. For example, Ali Erginay, MD, works with many patients who live in foreign countries who cannot visit the hospital due

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to travel restrictions. Those patients visit a doctor in their area to undergo imaging, which Dr. Erginay evaluates to decide if an intravitreal injection is needed.

### THE ROLE OF MULTIMODAL IMAGING

During the pandemic, multimodal imaging has proven a helpful tool in maintaining patients’ access to services. Platforms that offer multiple modes of imaging are quickly becoming the new standard of care in retina medicine. At our institution, multimodal imaging has become an important asset for several research initiatives, as well as for training purposes. From a clinical perspective, imaging pathology with only one technology could miss important features. The various modes on the Mirante complement each other in building a complete impression of the health of the retina. Having these all available on a single platform means that various modes can be aligned to the same anatomic reference point, thereby facilitating comparisons that aid in decision-making. Moreover, the Mirante features OCT with a maximum 16.5 x 12 mm scan area capable of capturing the macula and optic disc in a single shot, and 163° widefield photography measured from the center of the eye, which may be superior to standard fundus photography in many applications. For example, emerging evidence highlights the importance of findings in the peripheral retina in understanding



Figure. The Mirante Scanning Laser Ophthalmoscope by NIDEK.

and staging common retina vascular disorders, like diabetic retinopathy, and in rare conditions like Coats disease. Another feature available on the Mirante is that in addition to the ability to perform fluorescein and indocyanine green angiography in high definition, operators have access to OCT-A, which is less invasive and which captures and generates reports on features not available with traditional angiography.

Our institution is pursuing several lines of research to further refine the protocol for using multimodal imaging, especially in the context of teleconsultations. Among patients with diabetic retinopathy, we are comparing interpretations of a standard 45° fundus photograph with the Mirante’s 163° image measured from the center of the eye. Another ongoing project is to compare OCT-A on Mirante with other forms of imaging. We have already enrolled about 30 patients to a tele-retina study in which we are assessing outcomes of patients followed with teleconsulting. Some of the outcome measures of the study include patients’ visit time, the quality of the imaging, the ability of the retina specialist to make a diagnosis or treatment decision, and how many patients require follow-up visits after their initial appointment.

Our goal is to be able to refine the protocol to the point where there is no difference compared to a standard visit and that we can reduce the number of follow-up visits required to provide additional care.

Our institution was fortunate to have been already involved in offering telemedicine services and to have an electronic records system prior to the pandemic. With these two components already functioning, we could build on an existing framework to expand services. One of the limitations with the electronic records system we use is that there is not a good way to integrate images from the Mirante; instead we use dedicated viewing stations to analyze the images. In the future, we hope to integrate images into our record system, which will create even

more efficiency in managing a high volume of patients remotely. We also hope to incorporate artificial intelligence.

### CONCLUSION

The COVID-19 pandemic is an ongoing challenge, and the responses enacted by health care facilities around the world will continue to evolve and change. Our center is continuing to collect data and study outcomes, so as to continually refine the approach to patient care. We expect that even after we move past this period of history that many of the measures we have implemented in response to the pandemic will continue to be highly relevant for patient interactions.

We would like to close by thanking NIDEK for its support in developing this special protocol, as well as for providing the viewing technology utilized. Lastly, and as always, we wish to thank the patients who are participating in ongoing research efforts to improve remote access services. ■

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#### AUDE COUTURIER, MD, PHD

- Université de Paris, Ophthalmology Department, AP-HP, Hôpital Lariboisière, F-75010, Paris, France
- [audecouturier6@gmail.com](mailto:audecouturier6@gmail.com)
- Financial disclosures: Advisor or board member (Allergan, Bayer, Novartis)

#### ALI ERGINAY, MD

- Affiliations: Université de Paris, Ophthalmology Department, AP-HP, Lariboisière, Saint Louis and Fondation Rothschild Hospitals, Paris
- [ali.erginay@aphp.fr](mailto:ali.erginay@aphp.fr)
- Financial disclosures: None

#### RAMIN TADAYONI, MD, PHD

- Université de Paris, Ophthalmology Department, AP-HP, Lariboisière, Saint Louis and Fondation Rothschild Hospitals, Paris
- [ramin.tadayoni@aphp.fr](mailto:ramin.tadayoni@aphp.fr)
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