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Emergent Ophthalmic Surgical Care at a Tertiary Referral Center During the COVID-19 Pandemic



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- **PURPOSE:** This study characterized the delivery of emergent ophthalmic surgical care during April 2020 of the coronavirus disease-19 (COVID-19) pandemic compared with the same interval the previous year.
- **DESIGN:** Retrospective observational before-and-after study.
- **METHODS:** This study reviewed and characterized each emergent and/or urgent procedure performed during April 2020 and April 2019 at a single tertiary ophthalmology referral center. Information collected included the details of patient presentation, diagnosis, surgical procedure, and preoperative COVID-19 testing.
- **RESULTS:** In total, 117 surgical procedures were performed on 114 patients during the month of April 2020 compared with 1,107 performed in April 2019 ($P < .0001$). Retinal detachment repair was the most common procedure ($n = 37$; 31.6%) in April 2020, whereas elective cataract surgery ($n = 481$; 47.3%) was the most common procedure in April 2019. The mean age of patients was 50.0 years in April 2020 compared with 59.0 years ($P < .0001$) the previous year. During April 2020, the mean age of surgeons performing procedures was 42.3 years compared with 48.4 years ($P < .0001$) during April 2019. In April 2020, all but 5 patients (96%) had reverse transcriptase polymerase chain reaction based COVID-19 testing before their procedure. One patient (0.88%) had a positive COVID-19 test.
- **CONCLUSIONS:** The COVID-19 pandemic decreased our institution's surgical volume in April 2020 to approximately 10% of the usual volume. The pandemic changed the type of cases performed and led to a statistically significant decrease in both the age of our surgeons and patients relative to the same interval in the previous year. Broad preoperative screening led to 1 positive COVID-19 test in an asymptomatic patient. (*Am J Ophthalmol* 2021;222:368–372. © 2020 Elsevier Inc. All rights reserved.)

THE CORONAVIRUS DISEASE-19 (COVID-19) VIRAL epidemic brought elective medical care to a halt across the United States for much of March and April of 2020.¹ The American Academy of Ophthalmology (AAO) issued a statement on March 18, 2020 recommending that all ophthalmologists cease providing nonurgent care immediately.² Subsequently, the AAO published a list of urgent and/or emergent ophthalmic surgeries on March 27, 2020 including indications such as retinal detachment repair, open globe injuries, and others.³

The provision of emergent surgical care during the incipient stages of the COVID pandemic raised unique and unprecedented challenges for surgeons. Novel factors, including perioperative COVID testing, the availability and use of appropriate personal protective equipment, and the incorporation of telehealth upended traditional paradigms of surgical care.⁴⁻⁷

As a tertiary ophthalmic referral center with an emergency room operating 24 hours per day, our institution remained open to patients in need of urgent and emergent ophthalmic care. The present report reviews our experience of providing surgical care at the height of the first wave of the COVID pandemic (April 2020) compared with April 2019.

METHODS

THIS RESEARCH WAS CONDUCTED WITH THE APPROVAL OF the institutional review board at the University of Miami and in accordance with the Declaration of Helsinki. A waiver of informed consent was obtained from the review board because of the retrospective nature of the study.

A retrospective review of all operating room (OR) procedures performed at the Bascom Palmer Eye Institute during the months of April 2019 and April 2020 was performed. Information regarding patient demographics, referral method, point of presentation, diagnosis, procedure type, surgeon age, and COVID-19 testing was collected. Student's *t*-test was used for comparative analysis. A *P* value $< .05$ was considered statistically significant. Statistical analysis was performed using StataIC 15.1 (StataCorp, College Station, Texas, USA).

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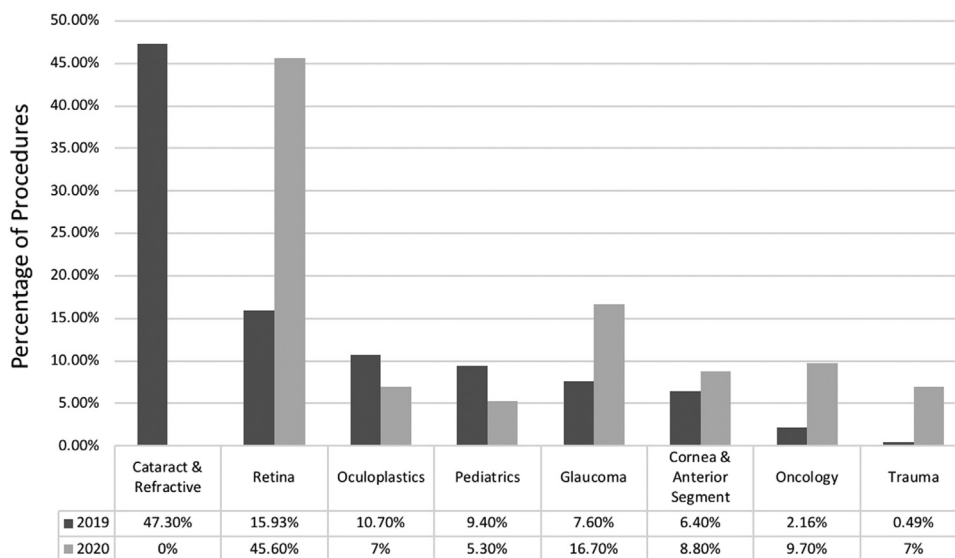


FIGURE 1. Procedures performed by specialty during April 2019 and April 2020. Comparing elective ophthalmic cases in April 2020 relative to 2019, cataract and refractive procedures fell sharply in 2020 while retina-related procedures increased as a proportion of cases.

RESULTS

IN TOTAL, 117 SURGICAL PROCEDURES WERE PERFORMED during the month of April 2020 at the Bascom Palmer Eye Institute compared with 1,107 procedures in April 2019. The mean age of patients was 50.0 years in April 2020 compared with 59.0 years ($P < .0001$) the previous year. During April 2020, the mean age of surgeons performing procedures was 42.3 years compared with 48.4 years ($P < .0001$) during April 2019.

Among the surgical procedures performed in April 2020, retina-related cases were the most common ($n = 52$; 45.6%), followed by glaucoma ($n = 19$; 16.7%), and ocular oncology ($n = 11$; 9.7%) (Figure 1). In comparison, elective cataract surgery ($n = 481$; 47.3%) was the most common procedure in April 2019, followed by retina ($n = 162$; 15.9%) and oculoplastics ($n = 109$; 10.7%) cases. The most frequently performed procedures in April 2020 were retinal detachment repairs ($n = 37$; 31.6%), aqueous shunt implantation, revision, or removal ($n = 15$; 12.8%), and examination under anesthesia ($n = 14$; 12.0%). The full lists of diagnoses and surgical procedures performed in April 2020 are listed in Tables 1 and 2, respectively.

During April 2020, 41 patients (36%) were referred from outside providers. Among all procedures, 65 (55.6%) cases were related to emergency room visits, whereas 52 (44.4%) resulted from scheduled clinic visits. For patients presenting through the emergency room, the mean time from initial presentation to the OR was 5 days. The patients' chief complaints for emergency room visits are summarized in Table 3. Among cases booked as a result of scheduled clinic visits, 45 (86.5%) were associated with in-person clinic visits, whereas 7 (13.5%) were the result of a telemedicine encounter.

The diagnoses for the telemedicine encounters that led to OR procedures included 2 retinal detachments, a uveal melanoma, a sebaceous cell carcinoma eyelid repair, a corneal ulcer, a congenital chorioretinal coloboma, and an ocular surface squamous neoplasia. Most telemedicine encounters ($n = 5$; 71.4%) were initiated based on urgent external referrals. For the 2 telemedicine patients who were not referred, 1 was a retinal detachment that was flagged for urgent in-person follow-up after a telemedicine visit with optometry, and the other was an established patient with a chorioretinal coloboma who underwent an examination under anesthesia.

All but 5 patients (96%) had reverse transcriptase polymerase chain reaction based COVID-19 testing before their procedure in the OR. One patient (0.88%) had a positive COVID-19 test. The average time between COVID testing and procedure was 0.77 days. All tested patients had a negative test result within a week of their procedure. Furthermore, 39 patients (34%) were tested on the day of surgery, and 67 (59%) were tested the day before their procedure.

DISCUSSION

THE COVID-19 PANDEMIC PROFOUNDLY AFFECTED NOT only the volume but also the type of procedures performed at our institution. During April 2020, surgeons performed only 10.6% of the number of cases recorded in April 2019. The COVID pandemic also changed the nature of cases performed. Although nearly one-half of cases in April 2019 were cataract extractions, no elective cataract surgeries were performed in April 2020 because of the ban

TABLE 1. List of Diagnoses Among Patients Requiring Surgery During April 2020

Diagnosis	No. of Patients (%)
Retina	41 (36%)
Rhegmatogenous retinal detachment	36
Macula off	30
Macula on	6
Tractional retinal detachment	4
Macular hole	1
Glaucoma	19 (16.7%)
Neovascular glaucoma	6
Uveitic glaucoma	4
Primary open-angle glaucoma	4
Steroid response glaucoma	1
Phacomorphic glaucoma	1
Tube exposure	1
Hypotony maculopathy	1
Aqueous misdirection	1
Pediatric	13 (11.4%)
Retinoblastoma	7
Congenital glaucoma	1
Familial exudative vitreoretinopathy	1
Incontinentia pigmenti	1
Coats disease	1
Chorioretinal coloboma	1
Anterior segment dysgenesis	1
Infectious	12 (10.5%)
Corneal ulcer	6
Endophthalmitis	5
Panophthalmitis	1
Trauma	15 (13.2%)
Ruptured globe	8
Traumatic hyphema	2
Intraocular foreign body with retinal detachment	2
Traumatic lens subluxation	1
Conjunctival foreign body	1
Canalicular eyelid laceration	1
Oncology	10 (8.8%)
Uveal melanoma	4
Ocular surface squamous neoplasia	2
Sebaceous cell carcinoma	1
Cutaneous melanoma	1
Choroidal mass	1
Conjunctival lesion	1
Miscellaneous	4 (3.5%)
Fuchs	1
Phthisis bulbi	1
Lens dislocation	1
Aphakia	1

on elective procedures during the statewide stay-at-home order and pursuant to the guidelines outlined by the AAO. Meanwhile, cases related to retinal detachments and trauma increased as a percentage of overall cases.

The decrease in our surgical volume at the height of the COVID shutdown was also a trend seen in most practices,

TABLE 2. Procedures Performed Throughout April 2020

Procedure	No. of Cases (%)
Rhegmatogenous retinal detachment repair	37 (31.6)
Aqueous shunt implantation/revision/ removal	15 (12.8)
Exam under anesthesia	14 (12.0)
Globe repair	7 (6.0)
Enucleation/exenteration/evisceration	6 (5.1)
Corneal transplantation	5 (4.3)
Pars plana vitrectomy for endophthalmitis	5 (4.3)
Radioactive plaque placement/removal	4 (3.4)
Tractional retinal detachment	4 (3.4)
Ciliary body cyclophotocoagulation	3 (2.6)
Eyelid repair	3 (2.6)
Excision of anterior segment lesion	3 (2.6)
Secondary intraocular lens	2 (1.7)
Anterior chamber washout	2 (1.7)
Foreign body removal	2 (1.7)
Combined vitrectomy and corneal transplant	2 (1.8)
Lensectomy	2 (1.8)
Macular hole repair	1 (0.9)
Vitrectomy for aqueous misdirection	1 (0.9)
Biopsy of retinal lesion	1 (0.9)

ophthalmology and otherwise, across the United States and the world.⁸⁻¹¹ In an analysis of patient volume in 40 U.S. states from March 24 to April 6, 2020, ophthalmology demonstrated the largest decrease in patient volume (81% compared with the previous year) among all medical specialties. Patients who accessed cataract evaluations and surgeries decreased by 97% compared to the previous year.⁸

• **STUDY LIMITATIONS:** As an academic institution serving a referral base for a large swath of the population in the south Florida area, our experience likely differed from surrounding private practices. With a fully operational, 24-hour emergency room receiving referrals and ease of access to operating rooms, we postulated our surgical volumes during this period were likely higher than those of private practices and outpatient surgical centers, many of which temporarily ceased operations.

Another interesting observation we found was that, on average, both the surgeons and patients involved in surgical cases were statistically significantly younger in April 2020 compared with April 2019. In terms of surgeons, the younger age in April 2020 could be explained by an institutional policy asking physicians older than 65 years to remain at home during the height of the first wave of the pandemic. No surgeons older than 65 years performed any cases throughout the entire month of April 2020. For patients, the younger mean age in April 2020 could be

TABLE 3. Chief Complaints Among Patients Requiring Surgery Who Initially Presented to the Emergency Room

Emergency Room Chief Complaint	No. of Patients
Blurred/decreased visual acuity	24
Eye pain	12
Shadow/curtain	11
Eye trauma	8
Flashes/floaters	6
Eye redness	2
Leukocoria	1
Loss of fixation	1

explained by several potential factors. First, there were no cataract cases during the lockdown, which likely drove the mean age of patients lower. Furthermore, older patients might have been more likely to stay at home despite ocular problems because of their higher risk of morbidity and mortality due to COVID-19.

Another consequence of the pandemic that affected our institution was the closure of surrounding ophthalmology offices. Many patients were unable to obtain surgical care locally and were referred to our institution. Such patients accounted for 36% of our surgical volume in April 2020. An additional 55.6% presented de novo through our emergency room, including a significant number of patients who required surgical interventions following ocular trauma (13.2%).

To handle the continued need for surgical care, several steps were taken to ensure patients could be cared for as safely as possible. A surgical oversight board was composed consisting of surgeons, anesthesia staff, nursing staff, and administrators. Each case was reviewed by the surgical oversight board based on factors, including the threat to vision and patients' ability to function. Operating room and emergency room teams were created, working on a rotating basis, to avoid cross-contamination. Surgeons performed cases with their usual staff whenever possible to minimize operative times.

Personal protective equipment was provided to patients and staff. All patients were required to wear masks during procedures. Surgeons, anesthesiologists, and nursing staff wore N95 masks within the operating suites. In the clinic rooms, all slit lamps were outfitted with plastic shields, and face shields were provided. No industry representatives were allowed into the OR, and visitors were prohibited.

An emphasis was placed on rapidly developing capacity to test all patients for COVID-19 as part of the preoperative workflow.¹² At the outset of the pandemic, COVID-19 tests were difficult to procure.¹³ Five patients with surgeries during the first 3 days of April 2020 were not tested for COVID before their procedures. However, as the availability of testing increased, all subsequent patients were tested. Once testing was available, the average test-to-OR time was less than a day. Currently, our institutional policy re-

quires preoperative COVID-19 testing of all patients within 24 hours of their procedure.

Another important consideration in providing surgical care during the COVID-19 pandemic was developing a protocol for the management of patients with positive tests. In our series, 1 asymptomatic patient tested positive for COVID-19. The patient carried a diagnosis of recurrent macula-sparing retinal detachment with stable visual acuity. The patient was offered the option of undergoing surgery at the main university hospital in a COVID-outfitted operating room or to delay the procedure with the caveat that the patient's visual symptoms did not change in the interim. The patient decided to quarantine for 14 days, denied changes in her visual acuity, and eventually tested negative on rescreening before proceeding to surgery. She had minimal anatomic progression at the time of surgery.

Finally, the COVID-19 pandemic also dramatically increased the use of telemedicine.^{14,15} Although these platforms currently have limitations, specifically in the ophthalmic examination of patients, in some cases, telemedicine served as an adjunct to office visits. For example, in the present series, a patient who noted decreased vision requested an appointment and underwent a "hybrid" telemedicine visit. The patient had a telemedicine encounter with optometry after which the patient was brought in for imaging in the clinic with minimal interaction with technicians. A retinal detachment was found by optometry during a review of the images, and the results were shared with the patient during another telemedicine visit. The retina service was notified within a day. Thus, telemedicine, particularly the hybrid model, can be of great use.

Ultimately, the COVID pandemic dramatically affected our delivery of surgical care. The volume of cases performed at our institution decreased significantly, and all cases were urgent or emergent. To protect patients during the delivery of care and preoperative screening, testing of surgical patients for COVID-19 was emphasized. Clear protocols were constructed to address patients with positive tests. Telemedicine was used as an adjunct when feasible to reduce in-person visits. Although this pandemic has led to unique challenges for surgeons and patients, with strategic planning we were able to provide safe surgical care for patients in need.

CONCLUSIONS

WITH CORONAVIRUS INFECTION RATES ONCE AGAIN RISING in Florida after reopening efforts and in many other states around the country, there remains a strong possibility of future stay-at-home orders and clinical disruptions as a result of the COVID-19 pandemic.¹⁶ We hope that our experiences navigating the pandemic will aid other

institutions in optimizing their response to this evolving public health challenge.

CRediT AUTHORSHIP CONTRIBUTION STATEMENT

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Thomas A. Lazzarini: Formal analysis, Methodology, Writing - original draft, Writing - review & editing. **Nimesh A. Patel:** Formal analysis, Methodology, Writing - original draft, Writing - review & editing. **Nicolas A. Yannuzzi:** Formal analysis, Writing - original draft, Writing - review & editing. **Jayanth Sridhar:** Formal analysis, Writing - original draft, Writing - review & editing. **Justin H. Townsend:** Formal analysis, Writing - original draft, Writing - review & editing. **Audina M. Berrocal:** Formal analysis, Writing - original draft, Writing - review & editing. **Zubair A. Ansari:** Formal analysis, Methodology, Writing - original draft, Writing - review & editing.

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