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Trends in the Clinical Presentation of Primary Rhegmatogenous Retinal Detachments During the First Year of the COVID-19 Pandemic

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• PURPOSE: To evaluate the effect of 1 full year of the coronavirus disease 2019 (COVID-19) pandemic on clinical presentation of acute, primary rhegmatogenous retinal detachment (RRD).

• DESIGN: Single-center, retrospective observational cohort study.

• METHODS: Patients were divided into 2 cohorts: consecutive patients treated for primary RRD during the COVID-19 pandemic (March 9, 2020, to March 7, 2021; pandemic cohort) and patients treated during the corresponding time in previous year (March 11, 2019, to March 8, 2020; control cohort). *Main outcome measures*: Proportion of patients presenting with macula-involving (mac-off) or macula-sparring (mac-on) RRD.

• RESULTS: A total of 952 patients in the pandemic cohort and 872 patients in the control cohort were included. Demographic factors were similar. Compared with the control cohort, a significantly greater number of pandemic cohort patients presented with mac-off RRDs ([60.92%] pandemic, [48.17%] control, $P = .0001$) and primary proliferative vitreoretinopathy ([15.53%] pandemic, [6.9%] control, $P = .0001$). Pandemic cohort patients (10.81%) had significantly higher rates of lost to follow-up compared with the control cohort (4.43%; $P = .0001$). Patients new to our clinic demonstrated a significant increase in mac-off RRDs in the pandemic cohort (65.35%) compared with the control cohort (50.40%; $P = .0001$). Pandemic cohort patients showed worse median final best-corrected visual acuity (0.30 logarithm of the minimum angle of resolution) compared with the control cohort (0.18 logarithm of the minimum angle of resolution; $P = .0001$).

• CONCLUSIONS: Patients with primary RRD during the first year of the COVID-19 pandemic were more likely to have mac-off disease, present with primary proliferative vitreoretinopathy, be lost to follow-up, and have worse final best-corrected visual acuity outcomes. (Am J Ophthalmol 2022;237: 49–57. © 2021 Elsevier Inc. All rights reserved.)

Coronavirus disease 2019 (COVID-19) was initially identified in Wuhan, China, in December of 2019[1] and was declared a global pandemic by the World Health Organization (WHO) on March 11, 2020.[2] The American Academy of Ophthalmology responded by issuing a statement 1 week later recommending all American ophthalmologists to immediately cease providing nonurgent care.[3] Subsequently, on March 27, 2020, the American Academy of Ophthalmology published a list of urgent and emergent ophthalmic surgeries that should continue unabated, including the repair of retinal detachment (RD).[4] Despite this guidance, studies have shown that fewer patients with ophthalmic emergencies sought care during the initial months of the pandemic.[5,6] This is also reflected outside of ophthalmology by a decline in overall emergency department visits[7] and critical procedures performed.[8,9] Possible explanations include challenges posed by stay-at-home measures, socioeconomic hardship, and general anxiety brought about by the pandemic.

Primary rhegmatogenous retinal detachment (RRD) is an ophthalmic emergency and results from a full-thickness retinal break secondary to vitreous traction, where liquified vitreous fluid flows through the break and accumulates within the subretinal space.[10,11] If subretinal fluid spares the macula (mac-on), the main goal of surgical timing is to preempt macular involvement (mac-off) as a detachment of the fovea confers a worse visual prognosis.[10] Progression to mac-off RRD can occur within hours to days, depending on various factors such as pseudophakia, site of retinal break(s), degree of vitreous liquefaction, bullous configuration, axial length, and age.[10,11] Duration of foveal detachment and better best-corrected visual acuity (BCVA) at the initial examination have been shown to correlate with improved postsurgical outcomes.[11]

Recent studies have demonstrated that clinical trends for patients presenting with primary RRDs have changed during the COVID-19 pandemic. Patel and associates[12] found

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that early in the pandemic a greater proportion of patients with primary RRDs delayed seeking medical care, had worse initial BCVA, and presented more commonly with significant clinical characteristics such as foveal detachment and primary proliferative vitreoretinopathy (PVR). Arjmand and associates[13] also reported a higher rate of worse clinical presentations but showed that final BCVA and anatomic outcomes remained the same. On the contrary, Breazzano and associates[14] reported a consistently lower volume of patients presenting with RRD across the United States in the pandemic through May 31, 2020, the endpoint of their study. The aim of our study was to evaluate the clinical characteristics of RRDs at presentation, treatment course, final outcomes, and factors in the Upper Midwest region of the United States that may impact these trends for the first full year of the COVID-19 pandemic.

METHODS

A retrospective cohort study was conducted adhering to the tenets of the Declaration of Helsinki and the US Health Insurance Portability and Accountability Act of 1996 with institutional review board approval by Allina Health care (Reference no.: 1666997). This study was Health Insurance Portability and Accountability Act compliant and was conducted at a multiprovider, multilocation single subspeciality (retina-only) private institution (VitreoRetinal Surgery, PLLC) located within the state of Minnesota, USA, in the metropolitan region of the cities of Minneapolis and St. Paul with satellite offices in the cities of Duluth and St. Cloud. Billing data from March 11, 2019, through March 7, 2021, were queried for the frequency of billed Current Procedural Terminology codes 67107, 67108, 67110, and 67113. The 52 weeks beginning on March 9, 2020, and ending on March 7, 2021, were designated as the year of the COVID-19 pandemic because of the WHO declaration (March 11, 2020) as well as stay-at-home orders implemented by the Governor of Minnesota (March 13, 2020). The previous 52 weeks beginning on March 11, 2019, and ending on March 8, 2020, served as the control year. Although 16 physicians completed preoperative evaluations during the total study period, 12 were present throughout 2019-2021. Patients were excluded if they had surgical repair of RRD in the same eye or if the etiology was not rhegmatogenous, including ocular trauma. Only the first eye was included in patients with bilateral RRDs during the same period.

Demographic, preoperative, operative, and follow-up data were collected from a review of the electronic medical record. Race was self-identified with categories of "Caucasian," "Black," "Asian," "Native American," "Hispanic," "Decline to Specify," or "Other." Median household income was used as a quantitative surrogate for socioeconomic status tabulated from the American Communities Survey 2017 of median income by the patient's home zip code. Patients were considered "established" if they had been previously seen by the practice within a 3-year period before the diagnosis of primary RRD; otherwise, they were considered "new." The distance from the patient's home zip code to the clinic of initial visit was used as a quantitative surrogate for health care access and was calculated on the basis of the shortest route (miles) mapped using Google Maps software (Alphabet Inc, Mountain View, California, USA). The time between initial diagnosis and surgery was recorded as well. Initial Snellen BCVA was obtained from the visit where the patient was diagnosed by our clinic. Final Snellen BCVA was determined at the longest postoperative visit; however, those with a follow-up course less than 3 months were excluded from analysis.

The primary outcome was the proportion of patients demonstrating mac-on RRD, as opposed to mac-off RRD (defined as the presence of subretinal fluid involving or within 1 optic disc diameter from the fovea) on preoperative clinical evaluation. Secondary outcomes include initial and final BCVA, proportion of patients with symptom duration of 1 day or less, mean duration of RRD symptoms (vision loss, flashes, floaters, or visual field defect), time to surgical repair, and the presence of grade C or higher primary PVR. The historical control group from 2019 was used as a comparator for all primary and secondary outcomes.

Statistical analysis was performed on JMP software (SAS Institute, Cary, North Carolina, USA). Snellen BCVA was converted to logarithm of the minimum angle of resolution (logMAR) units for quantitative analysis, with logMAR values for BCVA of "light perception," "hand motion," and "counting fingers" assigned values of 2.7, 2.3, and 1.8, respectively.[15] Comparison of categorical variables between 2 cohorts was completed using a 2-tailed Fisher exact test. Continuous quantitative variables including age, median household income, travel distance, duration of symptoms, time to surgery, and logMAR BCVA were found to be non-normal using the Shapiro-Wilk test. The median test, using median rank scores, was used for comparisons involving travel distance and logMAR BCVA. All other non-normal distributions were compared using the Mann-Whitney *U* test. A *P* value of less than .05 was considered statistically significant.

RESULTS

• **BASELINE COHORT CHARACTERISTICS:** Querying the billing data for Current Procedural Terminology codes 67110 (repair of RD using pneumatic retinopexy), 67107 (repair of RD using scleral buckle [SB]), 67108 (repair of RD using pars plana vitrectomy with or without SB), and 67113 (repair of complex RD) generated 1109 and 1090 procedures performed on unique patients during the pandemic and control years, respectively. After excluding patients without a primary rhegmatogenous etiology, a total

TABLE 1. Characteristics of Patients in the Pandemic and Control Cohorts

	Pandemic	Control	*P* Value
No. of patients	952	872	
Male sex (%)	65.37	64.70	.9135
Age (y), mean ± SD	61.89 ± 12.43	61.91 ± 12.73	.9220
Caucasian race (%)	94.12	94.32	.9474
Zip code-derived median household income (USD), mean ± SD	76,840.50 ± 23,571.87	78,081.56 ± 24,629.44	.2721
Time to surgical repair (d), mean ± SD	2.23 ± 4.67	1.85 ± 4.16	.8798
Duration of symptoms (d), median (interquartile range)	7 (3-20)	7 (3-16)	.7829
Seeking treatment within 1 d of symptom onset (%)	9.35	10.11	.8872
Distance to clinic (miles), median (interquartile range)	24.6 (11.8-66.4)	27.4 (12.75-79.8)	.0618
Mac-involved disease (%)	60.92	48.17	.0001
Primary PVR (%)	15.53	6.90	.0001
Established patients (%)	17.83	14.53	.0381
No. of CPT codes	67110 (PR): 10	PR: 7	.0001*
	67107 (SB): 152*	SB: 128	.0001**
	67108 (PPV): 73	PPV: 99	
	67108 (SB/PPV): 525	SB/PPV: 510	
	67113 (Complex RD): 192**	Complex RD: 138	

PPV = pars plana vitrectomy, PR = pneumatic retinopexy, PVR = proliferative vitreoretinopathy, RD = retinal detachment, SB = scleral buckle, SD = standard deviation, USD = United States dollars.

of 952 and 872 patients were assigned to the pandemic and control cohorts, respectively. Various baseline characteristics described in Table 1 were found to be similar between the 2 cohorts.

• **PRIMARY RRDS:** There was an increase in the total number of patients with primary RRDs who underwent surgical repair in the pandemic cohort compared with the control cohort over 1 year (Table 1). The greatest decline occurred in week 4 of the pandemic (March 30 to April 5, 2020), whereas the greatest increase occurred in week 47 (January 25-31, 2021) (Figure 1, A). When the year was divided into 3-month quarters, the most significant increase for the pandemic cohort occurred during the fourth quarter (Q4: December 7, 2020, to March 7, 2021); however, the second quarter (Q2: June 8 to September 6, 2020) also showed a significant increase (Figure 1, B). No significant differences were observed in the first (Q1: March 9 to June 7, 2020) and third (Q3: September 7 to December 6, 2020) quarters. The amount of laboratory-confirmed COVID-19 positive cases reported each week by the Department of Health of Minnesota is shown for reference (Figure 1, A).[16] Both cohorts showed similar numbers of pneumatic retinopexy and SB/pars plana vitrectomy procedures performed; however, we observed a significant increase in primary SB and complex RD procedures in the pandemic cohort (Table 1).

• **MACULA-INVOLVING DISEASE:** Mac-off RRDs in the pandemic cohort was significantly greater than the control cohort (Table 1). The greatest decline in the pandemic cohort occurred during week 4, and the greatest increase occurred during week 51 (February 22-28, 2021) (Figure 1, C). Although mac-off RRDs increased significantly ($P = .0001$) in the pandemic cohort for all quarters compared with the control cohort, the greatest increase was observed in Q4 (Figure 1, D).

• **PRIMARY PVR:** The presence of primary PVR in RRD was significantly greater compared with the control cohort (Table 1). Each quarter of the year exhibited a significant increase in the presentation of primary PVR in the pandemic cohort compared with the control cohort, with the greatest observed in Q2 (Figure 1, D).

• **LOSS TO FOLLOW-UP:** Postoperative follow-up data were collected for all patients in the study who underwent surgical repair of primary RRD. When examining the duration of follow-up, approximately 21.10% and 14.98% of patients did not present for a 3-month or later appointment in the pandemic and control cohorts, respectively. Further analysis revealed that a similar number of patients in the pandemic and control cohorts were referred back to their primary eye care provider before the 3-month time point for continued follow-up cares (PRN; Figure 2, A). Thus, the total number of patients who failed to present for follow-up appointments at 3 months and further (lost to follow-up) significantly increased in the pandemic cohort compared with the control cohort.

• **ESTABLISHED VS NEW PATIENTS:** A patient was deemed "established" if he or she was examined in the clinic within 3 years before the diagnosis of a primary RRD. Under these

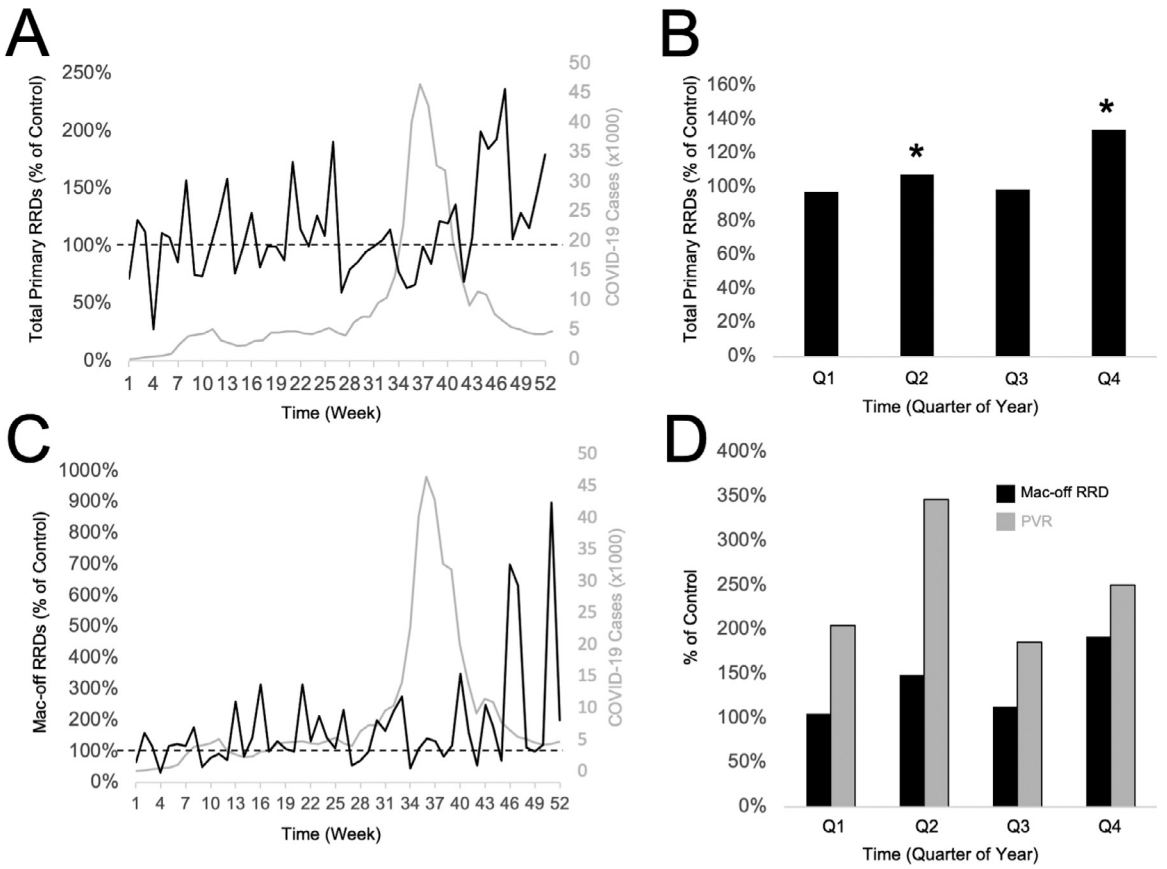

FIGURE 1. Trends in primary outcomes of primary rhegmatogenous retinal detachment (RRD) presentation. Total primary RRDs in the pandemic cohort are shown as a percentage of the control cohort over the first year of the COVID-19 pandemic (black line, A). For the entire year, the pandemic cohort exhibited a 9.17% increase (80 patients) in surgical repair compared with the control cohort. The greatest decline (−72.22%) occurred in week 4 of the pandemic, whereas the greatest increase (+136.36%) occurred in week 47. Quarterly analysis of total primary RRDs observed in the pandemic cohort expressed as a percentage of the control cohort (B) showed significant increases ($P = .0001$, indicated as *) in quarters 2 (Q2; +7.72%) and 4 (Q4; +33.69%). No significant differences were observed in Q1 ($P = .1217$) and Q3 ($P = .2282$). Mac-off RRDs within the pandemic cohort are shown as a percentage of the control cohort over the first year of the pandemic (black line, C), indicating the greatest decline during week 4 (−66%) and the greatest increase in week 51 (+800%). Quarterly analysis of mac-off RRDs (black bars) and the presence of primary proliferative vitreoretinopathy (PVR; gray bars) in the pandemic cohort expressed as a percentage of the control cohort (D) showed significant increases ($P = .0001$) for all quarters (Mac-off: Q1 = +4.72%, Q2 = +49.14%, Q3 = +12.84%, Q4 = +92.21%; PVR: Q1 = 104.55%, Q2 = 246.62%, Q3 = 85.71%, Q4 = 150%). The number of laboratory-confirmed COVID-19 cases reported each week in the State of Minnesota is overlayed in the same time period (gray line, A and C).

criteria, the pandemic cohort had a statistically greater proportion of established patients compared with the control cohort (Table 1). New patients were found to have significantly more mac-off RRDs in the pandemic cohort compared with the control cohort; however, this did not differ significantly when comparing established patients (Figure 2, B).

• **YOUNGER VS OLDER PATIENTS:** Using a cutoff age of 50 years, we analyzed the differences in primary RRD presentation between younger (age: ≤50 years) and older (age: >50 years) patients within the pandemic and control cohorts. Although more patients of both age subgroups were found to have mac-off RRDs in the pandemic cohort compared with the control cohort over the entire year, there was a significantly larger increase in the older subgroup (Figure 2, C). When the 1-year data were divided quarterly, analysis revealed a significantly lower proportion of mac-off RRDs observed during Q1 of the pandemic in the younger subgroup but increased in each subsequent quarter thereafter. In contrast, the older subgroup consistently demonstrated significantly greater proportions of mac-off RRD in each quarter throughout the pandemic.

• **VISUAL ACUITY:** For the entire year, initial presenting BCVA for the pandemic cohort was significantly worse compared with the control cohort; however, there was no significant difference observed in patients with mac-off dis-

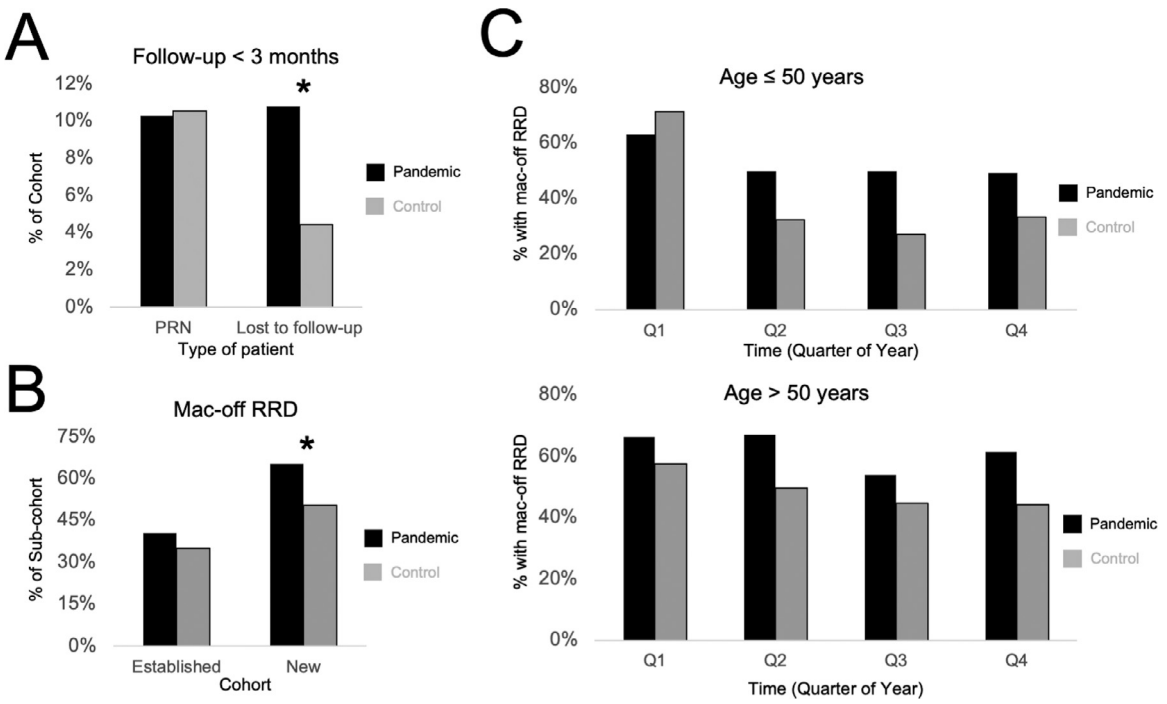

FIGURE 2. Trends in secondary outcomes of primary rhegmatogenous retinal detachments (RRDs). Patients who did not present for a 3-month or later postoperative examination were divided into those referred back to their primary eye care provider Pro Re Nata (PRN) or those who were lost to follow-up (right), expressed as a percentage of their respective pandemic (black bars) or control (gray bars) cohorts (A). We found no significant difference ($P = .8954$) in PRN patients (Pandemic = 10.28%; Control = 10.56%), but a significantly greater ($P = .0001$, indicated by *) proportion of pandemic patients were lost to follow-up (Pandemic = 10.81%; Control = 4.43%). There was no significant difference ($P = .3994$) in the proportion of established patients from both cohorts presenting with mac-off RRD (Pandemic = 40.59%; Control = 35.16%); however, the proportion of new patients with mac-off RRD in the pandemic cohort increased significantly ($P = .0001$, indicated by *; 65.35%) compared with the control cohort (50.40%; B). Over the entire year, older patients (age > 50 years) exhibited a significantly greater ($P = .0001$) increase in the proportion of mac-off RRDs (Pandemic = 62.50%; Control = 49.07%) compared with younger patients (Pandemic = 51.10%; Control = 42.50%). Younger patients demonstrated a significant decrease ($P = .0018$) in the percentage of mac-off RRDs in the pandemic cohort (black bar) compared with the control cohort (gray bar) in the first quarter (Q1); however, this trend reversed for the remainder of the year (C, top). In contrast, the percentage of older patients in the pandemic cohort with mac-off RRDs was significantly greater ($P = .0001$) than the control cohort throughout the pandemic (C, bottom). Q2 = 2nd quarter, Q3 = 3rd quarter, Q4 = 4th quarter.

ease between the pandemic and control cohorts (Figure 3). There was also no significant difference in initial BCVA observed in patients new to the clinic between pandemic and control cohorts. The final BCVA for the pandemic cohort was significantly worse compared with the control cohort. When focusing on mac-off RRD patients, final BCVA for the pandemic cohort was significantly worse compared with the control cohort. Finally, new patients in the pandemic cohort demonstrated significantly worse final BCVA compared with those in the control cohort.

• **TRAVEL DISTANCE:** After excluding 11 traveling patients with addresses of more than 700 miles from our clinics (2 from Arizona, 2 from Florida, 1 from Ohio, 1 from Oklahoma, 2 from Pennsylvania, 2 from Texas, and 1 from Wyoming), geographic analysis showed that there was no significant difference in distance traveled between the pandemic cohort and the control cohort (Figure 4, A). When we aggregated patients from both cohorts, we found that patients with mac-off RRDs traveled significantly further than patients with mac-on RRDs (Figure 4, B). There was no significant difference observed in distance traveled by patients with mac-off RRDs between the pandemic and cohorts (Figure 4, C). We also found that new patients traveled significantly farther distances to our clinics for care compared with established patients when aggregating both cohorts (Figure 4, D); however, there was no significant difference in travel distance by new patients between the pandemic and control cohorts (Figure 4, E).

DISCUSSION

Although previous studies on the effects of the COVID-19 pandemic clinical trends in emergent ophthalmic dis-

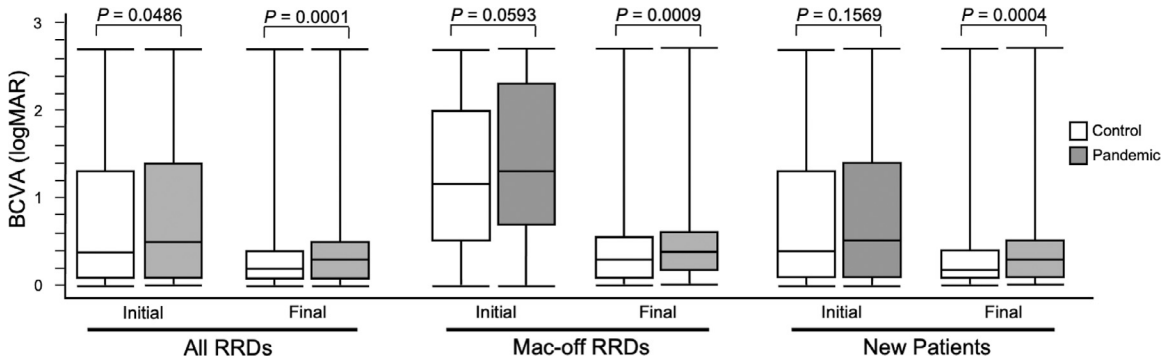

FIGURE 3. Distribution of logarithm of the minimum angle of resolution (logMAR) best-corrected visual acuity (BCVA) by cohort. Box-and-whisker plot illustrates distribution of logMAR BCVA between pandemic and control cohorts from initial and final clinical visits. Analysis is divided into all rhegmatogenous retinal detachments (RRDs) (left), mac-off RRDs (middle), and new patients to our clinic (right). The box depicts the interquartile range, the line within the box depicts the median, and the bars above and below the box depict maximum and minimum range, respectively. When considering all patients presenting with primary RRDs (left), the pandemic cohort showed both significantly worse ($P = .0486$) initial BCVA (median = 0.54 logMAR; Snellen equivalent, 20/70) compared with the control cohort (median = 0.40 logMAR; Snellen equivalent, 20/50) and significantly worse ($P = .0001$) final BCVA (median = 0.30 logMAR; Snellen equivalent, 20/40) compared with the control cohort (median = 0.18 logMAR; Snellen equivalent, 20/30). Patients presenting with mac-off RRDs during the pandemic (middle) did not exhibit a significant difference ($P = .0593$) in initial BCVA compared with the control cohort; however, the final BCVA in the pandemic cohort (median = 0.40 logMAR; Snellen equivalent, 20/50) was significantly worse ($P = .0009$) compared with the control cohort (median = 0.30 logMAR; Snellen equivalent, 20/40). There was no significant difference ($P = .1569$) observed in initial BCVA of new patients between the pandemic and control cohorts (right); however, new patients in the pandemic cohort demonstrated a significantly worse ($P = .0004$) final BCVA (median = 0.28 logMAR; Snellen equivalent, 20/40) compared with the control cohort (median = 0.18 logMAR; Snellen equivalent, 20/30).

eases have often focused on the initial months, we examined the first full year to evaluate long-term patterns. Similar to reports from Europe[17-20] and North America,[12,14,21] we experienced a significant decline in patients presenting with primary RRDs during the first few months; however, this quickly recovered to and even exceeded that, which was seen in the previous year. Our data support findings by Arjmand and associates[13] that there was no significant decline in primary RRD presentation during the first 6 months of the pandemic. Possible explanations include increased referrals to our practice as a result of reduced capacity by and/or closures of primary eye clinics as well as patient hesitation toward seeking care at hospital emergency departments due to fear of potential COVID-19 exposure.

We hypothesize that 2 events during the year may have had the greatest clinical impact on observed RRD trends in our study population: (1) the initial declaration of the global pandemic by the WHO (occurring in Q1) and (2) the exponential surge of laboratory-confirmed COVID-19 cases that Minnesota experienced from November to December of 2020 (occurring in Q3). RRD patients in Q1 may have delayed seeking care due to the novel nature of the virus and to our lack of understanding about its transmissibility at that time. With the statewide COVID-19 case surge in Q3, RRD patients may have delayed care due to a heightened sense of anxiety about potential viral exposure in a medical setting. These patients appear to have eventually presented for care and were captured in the Q2 and Q4 data, explaining the significant increase in both quarters for mac-off RRDs. Unfortunately, final BCVA outcomes may have suffered as a result.

The proportion of older (age: >50 years) patients presenting with mac-off RRD was consistently increased across all quarters of the pandemic year (Figure 1, H); however, this was not observed in younger (age: ≤50 years) patients during Q1 (Figure 1, G). Our findings support Patel and associates,[12] who reported no significant decline in the proportion of younger patients presenting with mac-on RRDs during the first 50 days of the pandemic. Interestingly, the proportion of younger patients presenting with mac-off RRD significantly increased for Q2 through Q4 in a similar trend as older patients. A possible explanation is the general anxiety about viral exposure in the later months of the pandemic eventually outweighed earlier perceptions of lower risk of COVID-19 morbidity and mortality in the younger age groups.

The presence of primary PVR is a poor prognostic factor associated with delayed presentation.[22] Even though this was significantly increased in all quarters of the pandemic year, we noted the greatest increase in Q2 (Figure 1, D). It is possible that Q2 is not only capturing patients who developed an RRD during Q1 and chose to delay care, but also patients who developed an RRD before the start of the pandemic and continued to delay care through Q1 from the heightened fear of the novel virus. Although the WHO de-

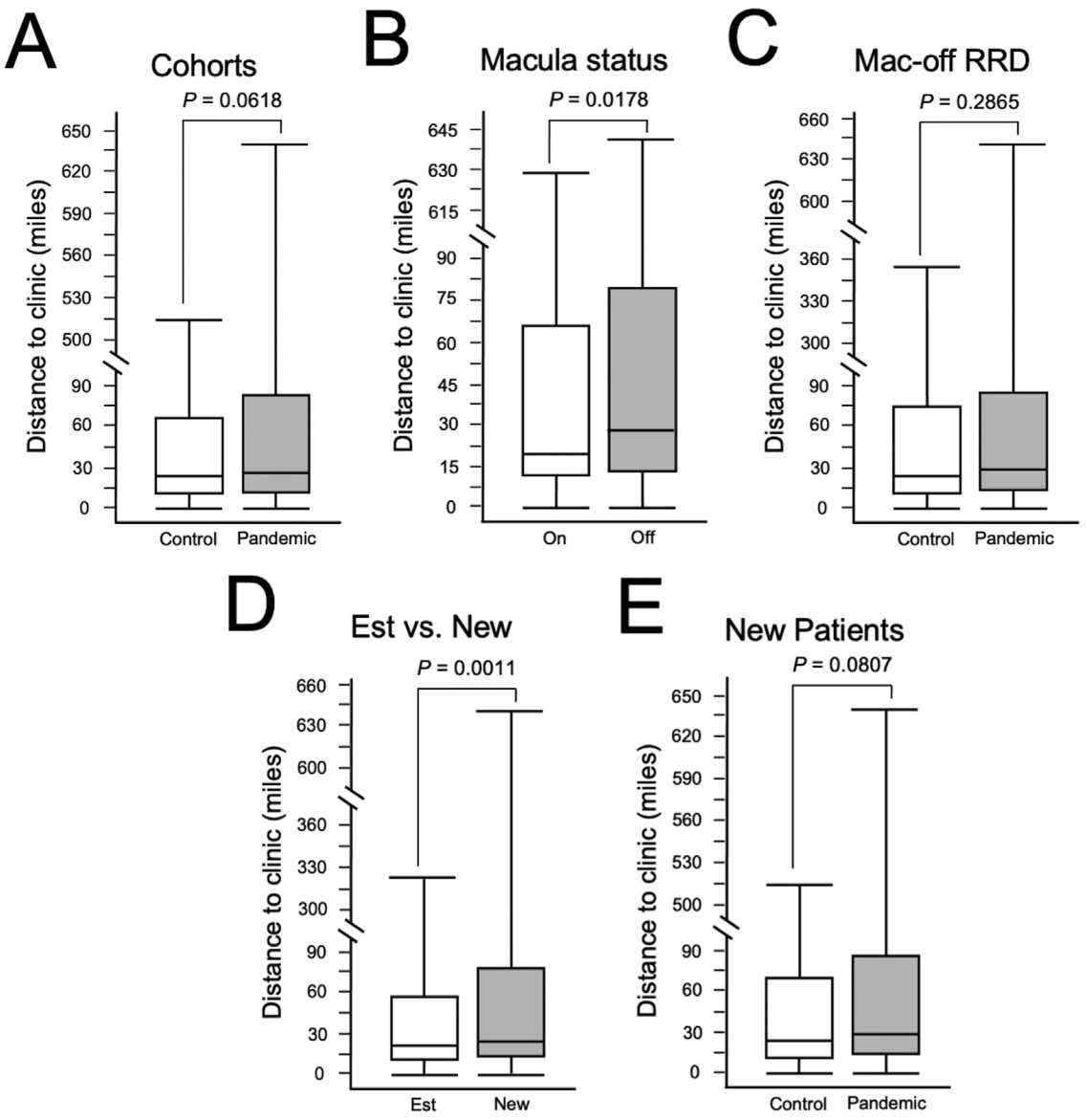

FIGURE 4. Distribution of travel distance by cohort. Box-and-whisker plot illustrating distribution of distance to clinic (miles) traveled by patients in various cohorts. The box depicts the interquartile range, the line within the box depicts the median, and the line bars above and below the box depict maximum and minimum range, respectively. No significant differences ($P = .0618$) were observed in travel distance between pandemic (median = 27.3 miles) and control (median = 24.6 miles) cohorts (A); however, patients with mac-off rhegmatogenous retinal detachments (RRDs) traveled significantly greater ($P = .0178$) distances (median = 28.2 miles) compared with patients with mac-on RRDs (median = 24.45 miles) when aggregating both pandemic and control cohorts (B). When comparing patients with mac-off RRDs between the pandemic (median = 28.9 miles) and control (median = 26 miles) cohorts, there was no significant difference ($P = .2865$) in travel distance observed (C). When aggregating both pandemic and control cohorts, patients who were new to our clinic (New) traveled a significantly greater ($P = .0011$) distance (median = 26.3 miles) compared with established (Est) patients (median = 22.5 miles; D); however, there was no significant difference ($P = .0807$) in distance traveled by new patients between pandemic (median = 28.7 miles) and control (median = 25 miles) cohorts (E).

cleared the global pandemic on March 11, 2020, earlier reports of viral spread were already occurring as early as December of 2019.[1] Further investigation to clarify this observation would be warranted.

General anxiety about potential COVID-19 exposure may also explain the significant increase in patients who were lost to follow-up after surgical repair. The 3-month or greater follow-up visit was chosen as the threshold because postsurgical factors such as residual intraocular tamponade agents and induced refractive error may confound BCVA measurements. It is possible that PRN patients could have been lost to follow-up with their local eye care provider af-

ter being referred back from our clinic; however, we do not have access to these outside clinical data.

The increase in mac-off RRDs during the pandemic was most noticeable in patients who were new to our clinic (Figure 1, F), similar to results from Patel and associates.[12] A likely explanation is that new patients may have lacked an awareness of clinical RD symptoms or failed to comprehend the importance of early treatment.[23,24] Furthermore, new patients may have faced additional logistical challenges to accessing retinal care as they are often depended on other providers (ie, emergency departments, optometry, primary care, etc) who made the initial diagnosis and subsequent referral to our clinic. The unfortunate result is that new patients during the pandemic year demonstrated a significantly worse final BCVA. With the reduced health care capacity for outpatient visits and numerous clinic closures from the financial impacts of the pandemic, these obstacles could create or exacerbate pre-existing health care disparities within various communities across the country.

Although the incidence of PVR and mac-off RRDs were higher during the pandemic, we found no statistically significant difference in patient-perceived duration of RD symptoms between the 2 cohorts (Table 1). We believe that this is due to the unreliability of patient-reported duration of RRD symptoms, as we observed no linear correlation between duration of symptoms and severity of disease for our current study. It is well known that determining RRD duration is difficult due to high variance of patient-reported symptoms,[25] which can be mitigated by incorporating specific questions during the history intake.[24,26] Unfortunately, these measures were not a part of our routine clinical practice during the duration of this study.

Numerous studies within ophthalmology and other fields of medicine have shown that the distance a patient travels for care can be a quantifiable marker for access to care.[27-30] In our study, we did not observe a significant impact by the pandemic on travel distance for our patients. Although overall patients in the pandemic cohort as well as those who were new to our clinic were trending toward further distances traveled, these measures did not obtain statistical significance. When looking at all patients in this study, regardless of whether they were in the pandemic or control cohort, we found that patients with mac-off RRDs and those who were new to our clinic traveled significantly further for care. This indicates broader disparities in access to health care that predates the pandemic. Further studies are essential to investigate this important topic.

There were several important limitations to our study. Because of its retrospective nature, there was inherent bias toward patient selection and loss to follow-up. Because the majority of our patient population is Caucasian with a median household income higher than the national median, this limits the applicability of our results across various racial and socioeconomic groups. Our geographical area and local market prominence may additionally limit the broader applicability of this study. Furthermore, the incidence of COVID-19 infections and the varying severity of public health measures taken by local governments varied greatly across the United States, limiting extrapolation of our data to other regions. Timing of surgery after the RRD was diagnosed did not differ between the 2 cohorts, indicating that our clinic was successful in maintaining access to the operating room during the pandemic. Because we chose the corresponding time from the previous year for comparison, innate variations in RRD presentation due to factors such as seasonal weather patterns and holidays should be controlled for.

To our knowledge, this study is the first to investigate changes in the clinical trends for primary RRD presentation over the first full year of the COVID-19 pandemic. It also contributes to national trends observed during the pandemic by commenting on the geographical trends seen in the Upper Midwest region in a large retina-only practice. We found that a significant number of our patients experienced a delay in obtaining care either due to anxieties about the pandemic or to difficulties in navigating a health care landscape beset by reduced capacity and financial hardships.[31,32] The unfortunate end result was increased mac-off disease and primary PVR, both of which contributed to worsened visual outcomes. With the declining numbers of COVID-19 cases being reported across the United States, availability of multiple effective vaccines, and the cautious reopening of communities, this devastating change in RRD trends observed during the first year of the pandemic will hopefully be mitigated.

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