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The difference in clinical characteristics between patients with rhegmatogenous retinal detachment during partial and complete lock-down periods related to COVID-19 pandemics 2-year long follow-up results

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Abstract

Background We aimed to compare results of clinical presentation of rhegmatogenous retinal detachment (RRD), and the surgical approach during partial or complete lock-down periods (LP), and non-COVID periods in a tertiary ophthalmology clinic.

Methods The medical data of the patients who were diagnosed with RRD in a tertiary hospital. The demographic data of patients, the duration from the beginning of the visual symptoms to hospital admission, the status of lens, the anatomical quadrant of retinal break, best-corrected visual acuity (BCVA) at presentation, the type of intraocular tamponade, and final BCVA were recorded. The exclusion criteria were RD other than rhegmatogenous (tractional or exudative), and incomplete follow-up until 2nd-year.

Results The study included 20 eyes of 20 RRD cases in partial LP, 20 eyes of 20 RRD cases in complete LP, and 23 eyes of 23 RRD cases in non-COVID period. The ratio of perfluoropropane (C_3F_8) gas to silicone oil which was applied as intraocular tamponade at the end of the surgery for RRD was 15/8 in non-COVID period, 11/9 in partial LP, and 11/9 in complete LP ($p=0.730$). In final visit at postoperative 2nd-year, the BCVA was logMAR 0.613 ± 0.425 in non-COVID period, logMAR 0.668 ± 0.348 in partial LP, and logMAR 0.730 ± 0.368 in complete LP ($p=0.612$). In both inferior and superior quadrant RD, there was significant difference between baseline and final BCVA after surgery. (Baseline and final BCVA in inferior RD: logMAR 1.71 ± 0.40, and logMAR 0.950 ± 0.30 ($p=0.011$) and, in superior RD: logMAR 1.35 ± 0.59, and logMAR 0.505 ± 0.321 ($p=0.0001$), respectively.)

Conclusions As a result, it seems that both partial and complete LP did not modify the typology of RRD surgeries.

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Trial registration Retrospectively registered. The study followed the tenets of the Declaration of Helsinki, and it was approved by the local ethical committee (2023-088).

Keywords Covid-19, Rhegmatogenous retinal detachment, Ophthalmological emergency, Perfluoropropane (C_3F_8) gas, Silicone oil

Introduction

The novel severe acute respiratory syndrome virus which is known as SARSCoV-2 was first identified in 2019 in Wuhan, China [1], and the global pandemic due to the coronavirus disease (COVID-19) has been declared by the World Health Organization (WHO) on 11 March 2020 [2]. After that, the COVID-19 pandemic affected all around the world and led to the widespread reorganization of healthcare services worldwide [3].

To prevent COVID-19 spread, the partial and complete lockdown period (LP) was applied at certain times in April 2021 in Turkey. The partial LP was at 14 April to 28 April 2021, while complete LP was from 29 April to 17 May 2021. The partial LP was implemented as a curfew between 19.00 and 05.00 on weekdays, and starting at 19.00 on Fridays by covering all Saturdays and Sundays and continuing until 05.00 on Mondays on weekends. The complete LP, which lasted for 19 days, started from 19:00 on Thursday, April 29, 2021 and lasted until 05:00 on Monday, May 17, 2021. With complete LP decision, whole activities except for urgent necessities such as food supply, or health emergencies were prohibited [4–6]. During LPs, the health authorities recommended to delay nonessential care but essential and urgent health service delivery was carried on in hospitals in Turkey. In our country, the Turkish Ophthalmology Society published a guidebook about the precautions for ophthalmological emergencies during pandemics, and recommended the operation for patients who were likely to have vision loss for glaucoma, patients with disrupted the integrity of the cornea and anterior segment, ocular traumas, retinal detachment, malignancies, etc [5].

The influence of COVID-19 was not only on the health care management, the patient behavior and the process management of surgeons also had its share of pandemics. Both of them acted cautiously for fear of COVID-19 contamination. For that, the patients were applied to the hospitals to seek treatment with delays, and the clinical presentations of ophthalmological pathologies changed as well as RRDs, one of the most urgent ophthalmological diseases. RRD is an emergent ophthalmic condition, because it may lead to significant visual loss, especially if delayed in presentation or surgery [7, 8].

The published reports were generally focused on the difference in vitreoretinal disease between COVID-19 and non-COVID periods while some of them were about the impact of containment on RD [3, 9–11]. In our knowledge, there is no published literature about the differences between partial and complete LPs. We aimed to compare results of clinical presentation of RRD, and the surgical approach during partial or complete LP, and non-COVID periods in a tertiary ophthalmology clinic in Turkey retrospectively. If the precise effects of pandemics on vitreoretinal diseases were identified, the precautions can be taken in future pandemic processes accurately.

Methods

The study followed the tenets of the Declaration of Helsinki, and it was approved by the local ethical committee (Izmir Katip Çelebi University; 2023-088). The medical data of the patients who were diagnosed with RRD in a tertiary hospital, İzmir Ataturk Research and Training Hospital between March and May 2021 were scanned retrospectively. The patients were divided into three groups according to the time of surgery as non-COVID period (31 March to 14 April 2019), partial LP (14 April to 28 April 2021), and complete LP (29 April to 17 May 2021).

The demographic data of patients, the duration from the beginning of the visual symptoms to hospital admission, the status of lens, the anatomical quadrant of retinal break, best-corrected visual acuity (BCVA) at presentation, the type of intraocular tamponade, and final BCVA were recorded. The exclusion criteria were RD other than rhegmatogenous (tractional or exudative), and incomplete follow-up until 2nd-year.

Statistical analysis

Statistical analysis were performed using the Statistical Package for Social Sciences, for Windows V.20 (SPSS, Inc, Chicago, Illinois, USA). All values were reported as mean ± standard deviation (SD). Categorical variables were expressed as proportions (*n*, %) and group differences were analyzed using Chi-square or Fischer's exact test. The normality of the data distribution was evaluated by Shapiro-Wilk test. For the difference between the parameters in duration of symptoms, age and BCVA, one-way ANOVA t-test was used in groups, and chi-square test was used for parametric values. P values < 0.05 were considered statistically significant.

Results

The files of 70 patients who underwent vitreoretinal surgery for RRD were scanned, and 7 of them were excluded due to failure during follow-up. The study included 20 eyes of 20 RRD cases in partial LP, 20 eyes of 20 RRD

cases in complete LP, and 23 eyes of 23 RRD cases in non-COVID period. The demographical features and preoperative clinical findings were summarized in Table 1.

The ratio of perfluoropropane (C_3F_8) gas to silicone oil which was applied as intraocular tamponade at the end of the surgery for RRD was 15/8 in non-COVID period, 11/9 in partial LP, and 11/9 in complete LP ($p=0.730$). In final visit at postoperative 2nd-year, the BCVA was logMAR 0.613±0.425 in non-COVID period, logMAR 0.668±0.348 in partial LP, and logMAR 0.730±0.368 in complete LP ($p=0.612$).

In both inferior and superior quadrant RD, there was significant difference between baseline and final BCVA after surgery. (Baseline and final BCVA in inferior RD: logMAR 1.71±0.40, and logMAR 0.950±0.30 ($p=0.011$) and, in superior RD: logMAR 1.35±0.59, and logMAR 0.505±0.321 ($p=0.0001$), respectively.)

Discussion

This study evaluated the effect of partial and complete LP during COVID-19 on RRD surgery and compared the clinical characteristics and outcomes with non-COVID period. The duration of RD, postoperative visual success, and preferred intraocular tamponade were identical in all periods. Our findings revealed that the convenient pandemic procedures and patient behavior at healthcare services in our country had adapted to the pandemic during the LP.

During both partial and complete LP, the number of surgeries for RRD was 13.0% less than non-COVID period. Most of the studies reported a decrease in the number of retinal surgeries for RRD during LP [12–16]. In contrast, some authors reported that the frequency of surgeries was increased during LP [10], and they associated this with increased attention to their health with more time than previously owing to the closing of schools and offices. Similar to our results, Jasani et al. reported a decrease in the number of RRD cases while the macular involvement and PVR increased during the pandemic LP in the United Kingdom [12]. As they mentioned, the decreased number of surgeries may be related to the avoidance of admission to the hospital for fear of COVID-19 contamination. On the other hand, the fewer RRD surgeries may lead to serious complications that may be challenging to deal. In the mentioned study, the complications related to delayed repair of RRD were more common [12]. The previous reports have associated this delay with difficulties to access health care, access to public transportation, and fear of public transport or coming to hospitals [9]. Although the operated RRD cases were less in COVID period, there was no significant change in partial or complete LP. These results suggest that patients with RRD in Turkey could admit to hospitals as usual even at the time of complete LP, without much deal.

Table 1 The demographic and clinical features of participants in preoperative period

	non-COVID (*n*:23)	partial LP (*n*:20)	complete LP (*n*:20)	*p* value
Age	57.9±11.3	55.6±10.0	55.6±9.3	0.700
Gender (FM/M)	10/13	7/13	7/13	0.800
Initial BCVA	1.391±0.652	1.535±0.500	1.545±0.506	0.602
The status of lens (phakic/PC-IOL)	13/10	13/7	14/6	0.648
Duration of RD	7.39±6.48	12.80±9.82	12.60±9.40	0.070
The anatomical quadrant of RRD (sup/inf)	16/7	12/8	12/8	0.750

COVID: Coronavirus disease, LP: Lockdown period, FM/M: Female to male ratio, PC-IOL: Posterior chamber intraocular lens, RD: Retinal detachment, RRD: Rhegmatogenous retinal detachment, p value: Statistically significant ratio

The duration of RRD was longer in both partial and complete LP than non-COVID period ($p=0.070$). Also, the patients may feel that the benefits of healthcare utilization outweigh the risk of infection [17] during pandemics. Furthermore, the patients may also be infected with COVID-19 at the time of RRD symptoms which may change the priorities. In all cases of both partial and complete LP groups, there was no COVID-19 symptomology or positive testing, so COVID-19 infection was not expected to influence the time to presentation. In addition, the duration from symptoms to admission was longer in inferior RRD than superior RRD (16.0 days and 7.7 days, respectively $p=0.001$) due to the uncertain presentation of the initial symptoms of inferior quadrant RRD.

Given the fact that inferior quadrant RRD has a poorer visual prognosis, both baseline and final BCVA were poorer in all groups with inferior retinal break (Baseline BCVA inf RRD: logMAR 1.71, sup RRD logMAR 1.35, $p=0.011$ and final BCVA inf RRD: logMAR 0.95, sup RRD: logMAR 0.50, $p<0.001$). The status of lens was similar among groups, so the influence of lens opacification was ignored. In RRD cases, one of the most likely factors to affect final visual acuity is macular involvement. Unfortunately, we did not evaluate the macular involvement, so we can not conclude about the effect of macular detachment on visual acuity. The previous reports declared that the LP affected the clinical patterns of RRD, and also the frequency of macular detachment has been increased during LP [12, 14]. The preferred intraocular tamponade was C_3F_8 in 55% of cases in both partial and complete LP patients while it was preferred in 65.2% of cases in non-COVID period ($p=0.730$). Although the possible complications are more often with silicone oil tamponade, the silicone oil seems to be more appropriate as a long-term tamponade to prevent recurrent RD in especially cases with PVR. On the other hand, the

recurrence rate in non-PVR patients was found similar for both gases and silicone oil [18].

The whole parameters in this study were identical among groups. It could be related to a few factors. In Turkey, both partial and complete lockdown process had several restrictions, but public transports were still active by showing HES code (HES code is a kind of QR code that was associated with the Ministry of Health database, and shows the status of vaccination, contact with infected cases, and the risk of COVID-19 infection). Therefore, the patients could admit to emergency departments for urgent symptoms whenever they noticed any subjective acute symptoms if they take the prescribed precautions. In contrast, stricter restrictions were imposed in other countries during LP [19, 20], and this may affect the number of surgeries or final visual gain.

This study has a few limitations. The rate of PVR and recurrent RD was uncertain because of retrospective design of the study. Only the RRD cases were included while tractional RD or intravitreal hemorrhages were excluded, the certain number of vitrectomy cases was unclear. Similarly, only the RRD patients who had PPV and internal tamponade were included while the data for scleral buckling was missing. Nevertheless, the duration from symptoms to admission was short in all groups, and the risk of PVR formation was not high. Also related to the short follow-up period, these results can not be generalized for the whole pandemic process. Although this is the first report that reveals the differences between partial and complete LP, the results only reflect the data at a single center. Also, the number of cases included in the study was small. The regional variations may exist between centers, so multicenter studies with larger case numbers may provide more reliable results. We hope to see the final of COVID-19 pandemic as soon as possible, and the results of post-COVID period may be useful to understand the long-term effects of pandemics.

Conclusions

As a result, it seems that both partial and complete LP did not modify the typology of RRD surgeries. The healthcare authorities should be aimed to ensure patients that they will not have an increased risk of contamination from the hospital when it is essential to seek emergency services. Because the avoidance of hospital admission in symptomatic patients may lead to serious problems in the future.

Abbreviations

RRD	rhegmatogenous retinal detachment
LP	lock down periods
BCVA	best corrected visual acuity
COVID-19	coronavirus disease
C_3F_8	perfluoropropane coronavirus disease

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none.

Author contributions

YZG, MV, GSV had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: All authors. Acquisition, analysis or interpretation of data: YZG, MV, GSV. Drafting of the manuscript: YZG, MV, GSV. Critical revision of the manuscript for important intellectual content: All authors. Administrative, technical, or material support: MOZ, OK. Study supervision: MOZ, EK.

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Data availability

The dataset used during current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

The study followed the tenets of the Declaration of Helsinki, and it was approved by the local ethical committee (Izmir Katip Çelebi University; 2023-088). Informed consent to participate was obtained from all of the participants in the study.

Competing interests

The authors declare no competing interests.

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