ORIGINAL ARTICLE

Impact of the COVID-19 Pandemic on the Number, Clinical Characteristics, Surgical Types, and Anatomical Outcome of Patients with Primary Rhegmatogenous Retinal Detachment during and after COVID-19 Lockdown in Thailand

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Background: During lockdown in 2020 from the outbreak of coronavirus disease 2019 (COVID-19), rhegmatogenous retinal detachment (RRD) has been affected in several aspects including prevalence alteration, delayed presentations, and poorer treatment outcomes. These effects are unknown after lockdown by comparing with the preceding year.

Objective: To determine the impact of the COVID-19 pandemic on the number, clinical characteristics, type of surgical procedure, and anatomical outcome of primary RRD during and after lockdown compared with those parameters in the same periods of the previous year.

Materials and Methods: In the present retrospective cohort study, the medical records of patients with primary RRD underwent retinal surgery at Mettapracharak Hospital during and after the first lockdown in 2020 and the corresponding period in 2019 were reviewed. These four periods had an equal number of days as the first lockdown period. The following data were analyzed, baseline demographics, initial clinical presentations, type of surgical procedure, and outcome.

Results: Four hundred fifty-five patients, for 455 eyes, underwent surgery for primary RRD. One hundred seven patients were treated during lockdown, 106 patients after lockdown, whereas 117 patients and 125 patients were treated in identical periods in the previous year, respectively. A decrease of 8.5% of RRD cases during lockdown and of 15.2% of RRD cases post-lockdown were documented. No significant differences were found with respect to demographic features, clinical characteristics, type of surgical procedure, or the anatomical single surgery success rate of RRD patients among all time periods. However, a significantly lower prevalence of right-eye involvement and shorter waiting time for surgery after lockdown were documented.

Conclusion: The authors revealed the impact of the COVID-19 pandemic on the reduction in the number of surgical procedures for primary RRD during and after lockdown. Our findings could aid redefinition of a strategic plan for RRD management after the COVID-19 pandemic had subsided.

Keywords: Rhegmatogenous retinal detachment; COVID-19; Pandemic; Lockdown; Tertiary hospital; Eye

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Rhegmatogenous retinal detachment (RRD) is an emergency ophthalmic condition necessitating surgical treatment to prevent irreversible blindness. For healthy individuals, the estimated annual incidence of RRD is 5 per 100,000[1] and increases from middle age and older age; the annual incidence in older people is 22 per 100,000[2].

Clinical characteristics upon initial presentation and symptom duration preoperatively are important for predicting final visual outcomes[3-5]. A worse outcome is predicted for people with RRD if there was macular involvement[3], symptom duration was prolonged[3-5], extensive detachment was presented[3,4], proliferative vitreoretinopathy (PVR) was presented, there was poor preoperative visual acuity, or the primary surgical procedure was unsuccessful[3].

The first patient outside of China to have coronavirus disease 2019 (COVID-19) was resident in Thailand[6]. The World Health Organization declared a COVID-19 pandemic, hereafter termed

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"pandemic", on March 11, 2020[7]. The sudden increase in deaths from COVID-19 led countries to impose social distancing, reduction in travel, and "lockdowns"[8-15]. A nationwide COVID-19 lockdown, hereafter termed "lockdown", in Thailand began on April 3, 2020[16]. Post-lockdown, a new outbreak of COVID-19 occurred. Different levels of lockdown were instigated between December 2020 and early 2022 in Thailand[17].

The pandemic lockdown affected RRD in various aspects. Scholars worldwide reported a reduction of 42% to 66% in the number of RRD cases during the pandemic compared with that of pre-pandemic[8-14]. Studies revealed an increasing trend of delayed presentation of RRD during lockdown compared with pre-pandemic. Prolonged symptom duration[9,12], higher prevalence of macula-off RRD[9-13], and increased cases presenting with PVR[9] have been reported.

Akram et al.[15] noticed a 292% increase in RRD cases during the pandemic compared with those in the same period in 2019. They noted that the symptom duration preceding presentation for macula-off RRD decreased significantly (p=0.006). A "rebound" effect of RRD cases after the end of the first wave was reported from Poland by Dmuchowska et al.[18].

The pandemic affected the treatment and outcome of RRD[19-22]. Jung et al.[22] found that longer-acting gas tamponade was employed commonly during lockdown, and that pneumatic retinopexy was undertaken significantly less often after lockdown (12%) compared with those during lockdown (22%) (p=0.048). They found that eyes repaired post-lockdown had an additional 22-day delay and lower single surgery success rate compared with eyes repaired during lockdown.

A rebound of RRD cases with delayed presentations or any change of treatment post-lockdown compared with during lockdown and pre-pandemic is still unknown. The authors aimed to identify the impact of the pandemic on the number, initial clinical characteristics, type of surgical procedure, and treatment outcomes of RRD patients during and after the first lockdown compared with those in the same period in the previous year in a tertiary referral hospital. These findings would aid in creating a management plan for RRD when the pandemic subsides.

Materials and Methods

Ethical approval of the study protocol

The study protocol aligned with the Declaration of Helsinki, and was approved by the Research Ethics Committee of Mettapracharak (Wat Rai Khing) Hospital (MH; Nakhonpathom, Thailand), registration number was COA 014/2564. The need for written informed consent was waived due to the retrospective design and use of deidentified data.

Exclusion criteria

Patients were excluded if the same eye had been treated previously with laser retinopexy or RRD surgery, or if they had not followed-up post-surgery. In bilateral RRD surgery within the same study period, only the first eye was included for analyses.

Study design

In the present retrospective cohort study, all patients with primary RRD that presented to the retina clinic and underwent RRD surgery at MH during the first lockdown, post-lockdown, and on the same day in 2019 were recruited. Four hundred fifty-five patients were included, which were 286 males and 169 females. The sample size of the present study was larger than the sample size of similar studies in other countries[20,22]. Most patients were referred from a government hospital in the fifth health area. Patients from private hospitals in the fifth health area and patients from outside of the fifth health area were also recruited.

In Thailand, the first lockdown was from the April 3 to June 30, 2020, which lasted 89 days. The authors evaluated data from an equal number of days in four periods. These periods covered the comparable range of weekdays and public holidays during lockdown (April 3 to June 30, 2020), post-lockdown (July 1 to September 27, 2020), same days as during lockdown in the previous year (April 3 to June 30, 2019), and same days as post-lockdown in the previous year (July 1 to September 27, 2019).

Data sources

The authors reviewed outpatient records, inpatient records, operative notes, and all available data on each patient. The collected information were demographic features at baseline such as age, gender, laterality, lens status, and date of first visit, initial clinical presentation with information such as symptom duration before hospital visit, best corrected visual acuity (BCVA) (Snellen BCVA was converted to logarithm of the minimum angle of resolution (LogMAR) visual acuity to allow for statistical analyses[23]), macular status, number of quadrants of RRD, treatment and outcome such as duration

Table 1. Demographic features of patients with primary rhegmatogenous retinal detachment who underwent retinal surgery during and post-lockdown in the COVID-19 pandemic in 2020 and the corresponding period in 2019

Feature	Total	2020		2019		p-value
		During lockdown (3 April to 30 June)	Post-lockdown (1 July to 27 September)	Corresponding period of during lockdown (3 April to 30 June)	Corresponding period of post-lockdown (1 July to 27 September)	
No. of patients	455	107	106	117	125	
Age (years)						0.855
Mean [SD]	53.7 [13.1]	53.8 [12.3]	53.4 [13.4]	53.0 [13.2]	54.4 [13.5]	
Range	18 to 86	23 to 81	23 to 83	18 to 79	19 to 86	
Sex; n (%)						0.896
Male	286 (62.9)	65 (60.7)	65 (61.3)	76 (65.0)	80 (64.0)	
Female	169 (37.1)	42 (39.3)	41 (38.7)	41 (35.0)	45 (36.0)	
Eye; n (%)						0.012[a]
Right	267 (58.7)	62 (57.9)	49 (46.2)	72 (61.5)	84 (67.2)	
Left	188 (41.3)	45 (42.1)	57 (53.8)	45 (38.5)	41 (32.8)	
Lens; n (%)						0.680
Phakia	344 (75.6)	78 (72.9)	80 (75.5)	94 (80.3)	92 (73.6)	
Pseudophakia	109 (24.0)	29 (27.1)	25 (23.6)	23 (19.7)	32 (25.6)	
Aphakia	2 (0.4)	-	1 (0.9)	-	1 (0.8)	

SD=standard deviation

[a] Significant difference between post-lockdown period in 2020 vs. corresponding period of post-lockdown in 2019

from hospital visitation to surgical procedure, type of surgical procedure, combined cataract-and-RRD surgery, and anatomical single surgery success (SSS) rate.

Definitions

Data on clinical characteristics were obtained from outpatient medical records upon the first visit to see a retina specialist. If unavailable, data from the inpatient records and operative notes were used. The authors did not include PVR signs due to differences in the grading and location of PVR documented by eye surgeons. LogMAR values corresponding to counting fingers, hand movements, perception of light, and no perception of light were substituted with a value of 1.98, 2.28, 2.70, and 3.00, respectively[24]. "Macula-off RRD" referred to cases in which the liquefied vitreous had entered the subfoveal space. "SSS" was defined as no recurrent retinal detachment within three months after the first surgical procedure for RRD.

Outcomes

The primary outcome was the number of RRD patients who underwent retinal surgery during and after lockdown compared with those in the same periods in 2019. The secondary outcome measures were the clinical characteristics, type of surgical procedure, and anatomical outcome of patients who underwent RRD surgery during and after lockdown compared with those in the same periods in 2019.

Statistical analyses

Data on demographic features and clinical characteristics were reported by descriptive statistics. Categorical data were presented as numbers and percentages. Continuous data with a normal distribution and non-normal distribution were presented as the mean (standard deviation; SD) and median (IQR). The difference in continuous data with normal or non-normal distributions between groups of time were compared using one-way analysis of variance and Kruskal-Wallis test with Dunn's post hoc test. The chi-square test with Bonferroni correction was used to compare categorical data. A p-value of less than 0.05 was considered significant. Data were analyzed using PASW Statistics for Windows, version 18.0 (SPSS Inc., Chicago, IL, USA).

Results

Four hundred fifty-five patients with 455 eyes underwent surgery for primary RRD by eight retinal surgeons at MH. One hundred seven patients were treated during lockdown, 106 patients after lockdown, whereas 117 patients and 125 patients were treated in the same periods in the previous year, respectively (Table 1). A decrease of 8.5% of RRD cases during lockdown and a decrease of 15.2% of RRD cases

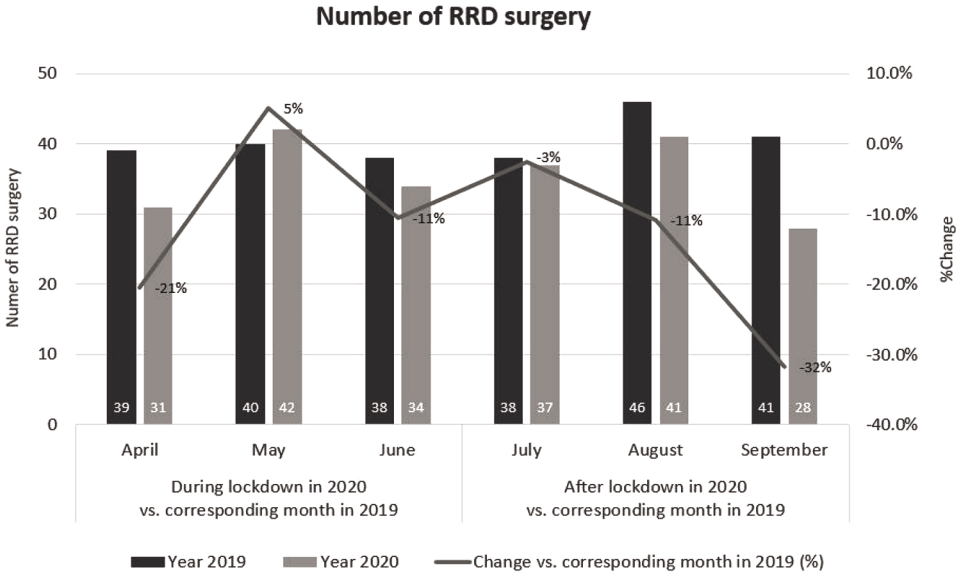

Figure 1. Monthly number of patients underwent retinal surgery for primary rhegmatogenous retinal detachment during and after lockdown in 2020 compared with the equivalent months in 2019.

after lockdown compared with those in the equivalent periods in the previous year were documented.

The percentage of patients that underwent RRD surgery in one month compared with that in the corresponding month in the previous year was reduced after lockdown initiation through to the third month after lockdown termination (Figure 1). A reduction of 21% or less in the first month during lockdown and of 32% or less at the third month after lockdown was documented. An increase of 5% in the second month during lockdown was noted.

The percentage change in the number of surgical procedures for RRD between corresponding months in 2020 and 2019 is presented as a line graph.

At baseline, significant differences were not observed for gender (p=0.896), age (p=0.855), or lens status (p=0.680) (Table 1). More than 60% of RRD cases in groups were male. The mean age of the study cohort was 53.7 (SD 13.1) years, and the age range was 18 to 86 years. More than 72% of RRD cases had phakia in all study periods. The right eye was involved more often than the left eye, except in the post-lockdown period (Table 1). The prevalence of right-eye involvement was significantly lower after lockdown, 49 patients (46.2%) compared with 84 patients (67.2%) at the equivalent time in the previous year (p=0.012).

Three hundred seventy-five patients (82.4%) were followed-up three months or longer. All 80 patients followed-up within three months had their retina reattached at their final visit. In addition, 10.3% of all participants were referred back to their local ophthalmologist (mean follow-up of 42 days) and 7.3% of all participants were lost to follow-up (mean follow-up of 38 days).

The clinical characteristics upon presentation, surgical treatment, and outcomes of all patients are summarized in Table 2. Significant differences were not observed in the median duration of symptoms (p=0.101), mean logMAR BCVA (p=0.408), prevalence of macula-on RRD (p=0.078), or prevalence of RRD extension (p=0.070) among the study groups (Table 2). At initial presentation, the mean logMAR BCVA of patients post-lockdown [1.51 (SD 0.83); Snellen equivalent 20/647] was slightly higher than those during lockdown [1.53 (SD 0.80); Snellen equivalent 20/677] and both were higher than that in the previous year [same period of lockdown: 1.58 (SD, 0.82); Snellen equivalent 20/760; same period of post-lockdown: 1.67 (SD 0.75); Snellen equivalent 20/935]. The prevalence of macula-on RRD after lockdown at 28.3% was greater than that during lockdown at 22.4% and was higher in both periods compared with that in the previous year, which was 20.5% during the same period of lockdown and 14.4% during the same period of post-lockdown. More than 40% of patients had extended RRD of two quadrants, followed by patients with extended RRD of four, three, and one quadrant. Post-lockdown, 51.9% of patients had extended RRD of

Table 2. Clinical characteristics upon presentation, type of surgical procedure, and anatomical outcome of patients with primary rhegmatogenous retinal detachment who underwent retinal surgery during and post-lockdown in the COVID-19 pandemic in 2020 and the corresponding periods in 2019

Clinical characteristics, treatment and outcome	2020		2019		p-value
	During lockdown (3 April to 30 June)	Post-lockdown (1 July to 27 September)	Corresponding period of during lockdown (3 April to 30 June)	Corresponding period of post-lockdown (1 July to 27 September)	
Symptom duration (days), median (IQR)	14 (7 to 30)	14 (5 to 30)	15 (7 to 45)	14 (6 to 30)	0.101
LogMAR					0.408
Mean [SD]	1.53 [0.80]	1.51 [0.83]	1.58 [0.82]	1.67 [0.75]	
Range	0 to 2.28	0 to 2.70	0 to 2.28	0.14 to 2.70	
Macula; n (%)					0.078
On	24 (22.4)	30 (28.3)	24 (20.5)	18 (14.4)	
Off	83 (77.6)	76 (71.7)	93 (79.5)	107 (85.6)	
Quadrants of RRD; n (%)					0.070
1	9 (8.4)	1 (0.9)	7 (6.0)	4 (3.2)	
2	43 (40.2)	55 (51.9)	54 (46.2)	53 (42.4)	
3	21 (19.6)	28 (26.4)	19 (16.2)	31 (24.8)	
4	34 (31.8)	22 (20.8)	37 (31.6)	37 (29.6)	
Time to operation (days); median (IQR)	1 (0 to 6)	1 (0 to 9)	3 (0 to 13)	5 (1 to 13)	0.007[a,b]
Type of surgery; n (%)					0.405
PR	18 (16.8)	19 (17.9)	29 (24.8)	30 (24.0)	
V-FGX	36 (33.7)	37 (34.9)	38 (32.5)	48 (38.4)	
V-VS	51 (47.7)	49 (46.2)	45 (38.5)	46 (36.8)	
SB alone	1 (0.9)	1 (1.0)	4 (3.4)	-	
SB-V-VS	1 (0.9)	-	1 (0.8)	1 (0.8)	
Combined with cataract surgery; n (%)	9 (8.4)	8 (7.5)	5 (4.3)	11 (8.8)	0.529
Single surgery success; n (%)	89 (83.2)	95 (89.6)	101 (86.3)	103 (82.4)	0.408

IQR=interquartile range; SD=standard deviation; LogMAR=logarithm of the minimum angle of resolution; PR=pneumatic retinopexy; V-FGX=vitrectomy with fluid-gas exchange (SF_6 or C_3F_8); V-VS=vitrectomy with vitreous substitutes (oil, heavy oil); SB alone=scleral buckle; SB-V-VS=scleral buckle combined with vitrectomy with vitreous substitutes

[a] Significant difference between post-lockdown period in 2020 vs. corresponding period of post-lockdown in 2019

[b] Significant difference between during lockdown period in 2020 vs. corresponding period of post-lockdown in 2019

two quadrants, followed by patients with extended RRD of three, four, and one quadrant (Table 2). Comparison of the proportion of RRD extension among all groups revealed the proportion of four-quadrant RRD to be least, at 20.8%, after lockdown, and one-quadrant detachment was highest at 8.4%, during lockdown (Table 2).

All patients underwent RRD surgery under local anesthesia. Preoperative testing for the nucleic acids of severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2) by reverse transcription-quantitative polymerase chain reaction (RT-qPCR) did not reveal COVID-19 in any patient. The median waiting time from hospital visitation to surgery during lockdown and after lockdown was one day. Before the pandemic, the median waiting time at the same time as lockdown was three days (IQR 0 to 13) and at the same time as post-lockdown was five days (IQR 1 to 13) as shown in Table 2. Post-lockdown, patients had a significantly shorter median waiting time for RRD surgery compared with those in the corresponding period the year before (p=0.007).

During the pandemic, surgeons mostly carried out vitrectomy with vitreous substitutes as V-VS with V-VS use during lockdown at 47.7% while V-VS use after lockdown was 46.2%. Fewer surgeons undertook pneumatic retinopexy than before the pandemic (Table 2), but a significant difference in the type of retinal-reattachment surgery among groups was not observed (p=0.405). Perfluoropropane (C_3F_8) gas was used in almost all cases with pneumatic retinopexy or vitrectomy with fluid-gas exchange (V-FGX) in all study periods. During and after lockdown, the prevalence of combined cataract-and-retinal surgery did not differ from that in the previous year (p=0.529) (Table 2).

The SSS rate was highest after lockdown at 89.6%, but a significant difference between study groups was not observed (p=0.408) (Table 2). The overall anatomical SSS rate was 85.3% (95% CI 81.7 to 88.2).

Discussion

Thailand has not encountered the steep increases in the number of COVID-19 cases seen in other countries. However, the results of rapid antigen tests for the nucleic acids of SARS-CoV-2 may not have been reported accurately, which hampers accurate monitoring of the pandemic[17].

Impact of pandemic on the number of primary RRD cases

The present study cohort had 455 participants. The number of patients was nearly identical between during lockdown (107 patients) and post-lockdown (106 patients). The number of RRD surgical cases in the pandemic year decreased by 8.5% during lockdown and decreased by 15.2% post-lockdown compared with that in the periods the year before. Whether these reductions in the percentage of patients was significant based on the geographic distribution of the population was not investigated.

The present study results are in accordance with those of other studies that reported a reduction in the number of RRD cases during lockdown[8-14], but not in accordance with data from the study by Akram et al.[15]. They documented an increase of 292% of RRD cases during the pandemic (35 patients) compared with the same period in 2019 (12 patients), with a significantly decreased duration of symptoms preceding presentation of macula-off RRD, which was had a median of 3 (range 1 to 14) days during the pandemic and 14 (range of 2 to 42) days in the pre-pandemic period (p=0.006). They suggested that severe limitation of local optometry services led to easier access to vitreoretinal departments and greater availability of operating theaters and surgeons.

Dmuchowska et al. found a rebound of RRD referrals with a maximum of a 150% increase only in the first month after ending of the first lockdown[18]. Due to the small sample size of their study, the authors analyzed the present study data further with regard to monthly numbers of patients in all study groups. A reduction in the monthly number of RRD cases was observed during and after lockdown. The authors did not find a significant increase in the number of RRD patients after lockdown, in contrast to the data reported by Dmuchowska et al.[18] and other scholars[8,11,14]. The authors noted a slight increase of 5% in the percentage of RRD cases in the second month during lockdown. This observation may have been due to a rebound effect in response to the sudden reduction in the number of RRD cases in the first month after lockdown onset.

The management plan for COVID-19 in MH during the pandemic was to limit non-emergency cases. RRD is an ophthalmic emergency. MH did not have an overwhelming number of COVID-19 cases compared with that in other tertiary referral centers in the same health region. In those hospitals, access to ophthalmic surgical services was limited because the focus was on caring for COVID-19 patients. Especially during lockdown, an excessive rebound of RRD patients to MH was not observed. Fear of contracting COVID-19 could be the leading cause of RRD reduction during pandemic[19]. This may be one of the reasons of the present study findings, that the reduction in the number of RRD cases post-lockdown may have been due to the relocation of people. The closure of businesses and factories in the present study health region during lockdown led some workers to return to their hometown. Even at lockdown termination, businesses had not fully recovered. When lockdown ceased, other tertiary hospitals did not suspend access to ophthalmic surgery, so the monthly number of RRD patients at MH decreased post-lockdown.

Impact of pandemic on the baseline demographics of RRD patients

The demographic features of the present study RRD patients in all time periods were not significantly different with respect to gender (p=0.896), age (p=0.855), or lens status (p=0.680) (Table 1).

The male predilection to RRD and mean age in all periods (Table 1) corresponded to those in a large epidemiology study in China[2] and studies on primary RRD during and before the pandemic[12,13,20]. In all time periods, more than 72% of participants had phakia after secondary RRD from cataract surgery had been excluded. The present study data are consistent with findings from large studies[20,22].

The right eye was involved more often than the left with regard to RRD. The present study observation is in accordance with the trend in most studies[2,4] and the work of Jung et al.[22], but not post-lockdown. The authors found a significant reduction of right-eye involvement post-lockdown compared with the equivalent time period in the previous year at 46.2% and 67.2%, respectively (p=0.012). Jung et

al.[22] stated that, post-lockdown, the right eye became increasing involved at 65% post-lockdown compared with 53% during lockdown (p=0.05).

Impact of pandemic on the clinical presentation, surgical treatment, and outcomes of RRD

Symptom duration upon meeting with a retina specialist was not significantly different among study groups (p=0.101) (Table 2). No patients showed a positive RT-PCR test or a history/symptoms for COVID-19. In addition, the retina specialist in MH was available daily, so the SARS-CoV-2 infection and the time before seeing a specialist did not affect symptom duration.

Significant differences were not observed in the mean logMAR BCVA (p=0.408), prevalence of macula-on RRD (p=0.078), or prevalence of RRD extension (p=0.070) among study groups (Table 2). The present study results for initial BCVA, macular status and extension of RRD showed the same trend with regard to early presentation of patients post-lockdown compared with during lockdown and pre-pandemic.

With respect to the clinical characteristics of RRD patients, the present study result does not support data from studies that revealed an increasing trend of delayed presentation of RRD during lockdown compared with pre-pandemic[9-13,20].

These different results for RRD presentation may have been because the present study RRD patients had delayed clinical signs even before the pandemic compared with those in other studies focusing on RRD during and before the pandemic[9-13,20]. This hypothesis was supported by our findings that the type of surgical procedure for RRD and outcome were not significantly different among time periods (Table 2). Pneumatic retinopexy was carried out less often, and V-VS was undertaken more often, pre-pandemic. Long-acting C3F8 gas was used in almost all cases with pneumatic retinopexy or V-FGX in all study periods. The overall SSS rate was 85.3% (95% CI 81.7 to 88.2).

Arjmand et al.[20] reported pneumatic retinopexy to be the most commonly undertaken procedure before the pandemic (49%) and after (about 52%), with a successful outcome documented in 71.5% of patients. Jung et al.[22] found that longer-acting gas tamponade was employed commonly during lockdown, and that pneumatic retinopexy was undertaken significantly less often after lockdown at 12% compared with that during lockdown at 22% (p=0.048). They found that eyes repaired post-lockdown had an additional 22-day delay and lower SSS rate compared with eyes repaired during lockdown.

Both studies addressed the issue of operating-theater closure during lockdown. Surgeons carried out primary repair with in-office pneumatic retinopexy[20,22], and a lack of access to protective equipment[20] limited the surgical services available in a pandemic. Those issues may be the cause of different results compared with the present work. Moreover, the relatively delayed clinical characteristics of the present study RRD patients and limited availability of outpatient clinics led to greater use of V-VS in the present study, especially during lockdown (about 48%) and after (about 46%), though a significant difference in these parameters from the previous year (about 39% and 37% at identical periods during and after lockdown, respectively) was not observed.

No significant difference was noted for the prevalence of combined cataract-and-retinal surgery among the four study periods (p=0.529), similar to data from a study by Schranz et al.[21]. Roshanshad et al. noted a change in choice of procedure from vitrectomy to phocovitrectomy during lockdown to reduce the number of procedures, decrease the use of personal protective equipment, and decrease patients' costs[19].

The median waiting time from hospital visitation to surgery during and after lockdown was one day. A significantly shorter waiting time post-lockdown compared with that at the equivalent time in the previous year of 5 (IQR 1 to 13) days (p=0.007) (Table 2) was noted. The authors hypothesized that the availability of operating theaters and Retinal Care Team, a reduction in the number of elective cases during lockdown, and an absence of rebound of elective surgery in an uncertain post-lockdown situation influenced the results. The SSS rate was highest post-lockdown at 89.6% compared with other groups, though the difference was not significant (p=0.408).

Schranz et al.[21] revealed no change in the time from symptom onset to surgical procedure during lockdown. However, they noted a tendency towards a lower SSS rate compared with that in an identical period in the previous three years. Their patients showed no significant difference in the prevalence of macula-on RRD among groups, but a higher prevalence of PVR in the lockdown group.

The authors did not study long-term anatomical and visual outcomes due to five main reasons, (i) an uncertain pandemic condition, (ii) limited availability of outpatient clinics, (iii) some patients with a

reattached retina were referred back to their local ophthalmologist, (iv) the present study specialists preferred to prolong retinal reattachment if V-VS were used, and (v) visual disturbance from oil could affect the visual outcome. However, further study on the long-term effects of pandemic on clinical characteristics, treatment, and outcomes of RRD patients should be evaluated after the pandemic ends.

The main strengths of the present study were a large study cohort, consideration of the variables of weekends/public holidays, and that only eight retinal surgeons carried out the procedures. These considerations reduced the risk of differences in surgical techniques and subjective reporting. The result of the present study can be generalized to healthcare providers with similar healthcare settings for the next waves of COVID-19 or other similar conditions.

The present study had three main limitations. First, this was a retrospective study in a tertiary hospital. Second, there was a delay from referral from an ophthalmologist to the retina specialist or because the patient took a long time before consulting a retina specialist. Lastly, only RRD patients in the first wave of pandemic were evaluated.

Conclusion

A decrease of 8.5% of RRD cases during lockdown and of 15.2% of RRD cases post-lockdown compared with those in the equivalent periods in the previous year was documented. Significant differences were not found with respect to demographic features, clinical characteristics, type of surgical procedure, or the anatomical outcome of RRD patients among all time periods. However, a significantly lower prevalence of right-eye involvement and shorter waiting time for surgery after lockdown compared with those in the corresponding periods in 2019 were documented. The overall prevalence of success after a single surgical procedure was 85.3%.

What is already known on this topic?

RRD is an emergency ophthalmic condition necessitating surgical treatment to prevent irreversible blindness. Initial clinical presentation and symptom duration preoperatively are important for predicting final visual outcomes. Studies revealed the COVID-19 pandemic has affected RRD presentation and treatment. A rebound of RRD cases with delayed presentations or any change of treatment after lockdown compared with during lockdown and pre-pandemic is still unknown.

What this study adds?

This study showed the impact of the COVID-19 pandemic on the reduction in the number of surgical procedures for primary RRD during and after lockdown. There was no effect on the presentations, type of surgery, and anatomical outcome. Health education to patients for early-symptom detection and early hospital visitation together with the availability of ophthalmic emergency services are important for RRD management. These findings could aid redefinition of a strategic plan for RRD management after the COVID-19 pandemic subsides.

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Conflicts of interest

The authors declare no conflict of interest.

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