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Comparison of clinical parameters in patients with cataract surgery during and before COVID-19 pandemic

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Abstract

Purpose: The purpose of this study was to compare the clinical features of pre-pandemic and pandemic patients who had elective cataract surgery in our hospital.

Methods: This study is a retrospective study. Cataract surgeries performed in our clinic between March 2019 and June 2021 were screened. Patient's age, gender, eye laterality, cataract type, preoperatively best-corrected visual acuity (BCVA) in the eye with a cataract, pseudoexfoliation, and other compelling factors for surgery were noted. Considering that there was no elective cataract surgery in our hospital between March 2020 and June 2020 due to the COVID-19 pandemic, 1-year data before March 2020 and 1-year data after June 2020 were included in the study. Patient data from these two periods were compared with each other.

Results: The pre-pandemic and pandemic groups had 560 eyes of 489 patients and 590 eyes of 534 patients, respectively. The patients in the pre-pandemic group were significantly older than those in the pandemic group (69 vs. 67 years, $P=0.046$). The mean BCVA differs according to the groups (0.163 ± 0.148 vs. 0.130 ± 0.132) ($P<0.001$). The rate of blindness was significantly higher in the pandemic group than in the pre-pandemic group (39.3% vs. 31.4, $P=0.006$). There was no difference in the number of brown/mature cataracts between the two periods ($P:0.629$). Diabetic retinopathy was significantly lower during the pandemic period. The number of traumatic cataracts increased substantially during the pandemic.

Conclusion: We encountered cataract patients with lower pre-operative best-corrected visual acuity during the pandemic.

Keywords: Cataract; cataract surgery; COVID-19; pandemic.

The first COVID-19 case in Turkey was reported on March 11, 2020. After this period, closure started, and patient admissions were limited in the hospital. Surgery was not accepted in our hospital from this date until June 2020, except for emergencies. During this period, elective cataract surgeries were postponed in our hospital.

Recent articles have emphasized that elective cataract surgery decreased during the pandemic.^[1-3] Delayed elec-

tive cases have also been preferred in other countries.^[4] It has also been emphasized in the literature that delayed cataract surgeries can cause a significant accumulation after closure.^[5]

Delaying the surgical time of the patients may also change their clinical status. Therefore, we aimed to compare the clinical features of patients in pre-pandemic and pandemic periods who had elective cataract surgery in our hospital.



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Materials and Methods

This study is a retrospective study. In this retrospective study, cataract surgeries performed in Hitit University Ophthalmology Department between March 2019 and June 2021 were scanned from the hospital information system (AKGÜN web HBYS, Ankara, Turkey country) and the surgeon's operating book. Patients' age, gender, eye laterality, cataract type, pre-operative best-corrected visual acuity (BCVA) in the eye with a cataract, presence of pseudoexfoliation, and other compelling factors for surgery were noted. BCVA was expressed as a decimal. Visual acuity at 1-meter finger counting and hand movement level was defined as decimal according to the conversion table.^[6] Patients with light perception and projection were not excluded from the study but were not included in the mean visual acuity. The study's exclusion criteria were pediatric cataract surgeries and patients for whom the data were unavailable in the records. The blindness criteria accepted by the World Health Organization (0.01/0.001/p+) were used as the blindness level in our study.^[12]

During the COVID-19 pandemic, our approach in the operating room and pre-operative examination has not changed, except for the contamination measures of health-care workers, and patients for cataract surgery. The kind of anesthesia, including topical proparacaine and intracameral lidocaine, post-operative medication, and the number of post-operative visits after surgery, did not change during the pandemic. If the pre-operative BCVA of the patient was 0.6 or less, surgery was recommended for the patient. The surgical decision was taken with the patient's consent. Simultaneous bilateral cataract surgery is not performed in our hospital. During this period, all patients who will undergo elective surgery in our hospital (including cataract surgeries) underwent the COVID-19 polymerase chain reaction test the day before and were kept under observation in the hospital for a pre-operative night. The surgery of the patients who tested positive was postponed.

Considering that cataract surgery was not performed in our hospital between March 2020 and June 2020, 1-year data before March 2020 and 1-year data after June 2020 were included in the study. The first 1-year period was designated as the pre-pandemic period and the second 1-year period as the pandemic period. We compared the number of cataract surgeries and patient data in these two periods.

Clinical Research Ethics Committee of Hitit University approval was obtained (No: 2022-5, 19.01.2021). This study was carried out in accordance with the principles of the Declaration of Helsinki. The authors declared that getting consent from the patients was unnecessary because the study was a retrospective data analysis.

Statistical Analysis

For descriptive statistics, mean \pm standard deviation was used to give continuous data with normal distribution. Median with minimum-maximum values was applied for continuous variables without normal distribution. Numbers and percentages were used for categorical variables. The Shapiro–Wilk, Kolmogorov–Smirnov, and Anderson–Darling tests analyzed the normal distribution of the numerical variables.

The Independent samples t-test compared two independent groups where numerical variables had a normal distribution. The Mann–Whitney U-test was applied for the variables without normal distribution in comparing two independent groups. The Pearson Chi-square and Fisher's Exact tests were used to compare the differences between categorical variables in 2×2 tables. The Fisher-Freeman-Halton test was used in $R \times C$ tables.

Jamovi (Version 2.2.5.0) and JASP (Version 0.16.1) were used for statistical analysis. The significance level (P-value) was determined at 0.05 in all statistical analyses.

Results

During the pre-pandemic and pandemic periods, there

Table 1. Demographic characteristics of the groups

	Pre-pandemic group (n=560)	Pandemic group (n=590)	P
Mean age (year)†	67.6 \pm 10.7	66.8 \pm 9.2	0.046*
Median age (year)§	69.0 (62.0–75.0)	67.0 (61.0–73.0)	
Sex‡			
Male	295 (52.7)	315 (53.4)	0.855**
Female	265 (47.3)	275 (46.6)	

‡n (%); †mean \pm standard deviation, §median (min-max); *Mann–Whitney U-test; **Pearson Chi-square or Fisher's Exact test.

Table 2. Rate of comorbidities per patient between the groups.

	Pre-pandemic Group (n=560)	Pandemic Group (n=590)	P*
Comorbidity‡	130 (23.2)	131 (22.2)	0.735
Mid-dilated pupil	58 (10.4)	68 (11.5)	0.590
Diabetic retinopathy	35 (6.2)	10 (1.7)	<0.001
Enophthalmic eye	17 (3.0)	26 (4.4)	0.285
Age-related macular degeneration	13 (2.3)	5 (0.8)	0.076
Glaucoma	11 (2.0)	6 (1.0)	0.277
Traumatic cataract	1 (0.2)	11 (1.9)	0.012
Corneal scar	2 (0.4)	6 (1.0)	0.289
Uveitis	4 (0.7)	2 (0.3)	0.441
Epiretinal membrane	0 (0.0)	4 (0.7)	0.125
Nystagmus	1 (0.2)	1 (0.2)	0.999
Retinitis pigmentosa	0 (0.0)	2 (0.3)	0.500

‡n (%); *Pearson Chi-square or Fisher's Exact test.

were 560 eyes of 489 patients and 590 eyes of 534 patients, respectively. The patients in the pre-pandemic group were significantly older than those in the pandemic group (median age 69 vs. 67 years, $P=0.046$). The sex distribution was similar in the groups ($P=0.855$). The demographic characteristics of the groups are presented in Table 1.

Table 2 presents the frequencies of the comorbidities in the groups. In almost one-quarter of the eyes in each group, we detected one type of comorbidity (23.2% in the pre-pandemic vs. 22.2% in the pandemic groups, $P=0.735$). The mid-dilated pupil was the most frequent comorbidity seen in 10.4% and 11.5% of the eyes in the groups pre-pandemic and pandemic. However, the difference in the proportion of the eyes with the mid-dilated pupil was insignificant ($P=0.590$). We detected significant differences between the groups' frequencies of diabetic retinopathy and traumatic cataract (Table 2). The eyes in the pre-pandemic group had significantly higher rates of diabetic retinopathy than those in the pandemic group (6.2% vs. 1.7%, $P<0.001$). There were more eyes with traumatic cataracts in group pandemic than in group pre-pandemic ($P=0.012$). The distribution of other diseases was similar in the groups ($P>0.05$).

There were significant differences in the ocular findings between the groups (Table 3). The BCVA was significantly lower in the pandemic group ($P<0.001$). We detected no significant difference in the rate of light perception and projection positivity (p+p+) between the groups ($P=0.891$). The proportion of the eyes with BCVA higher than 0.001 was significantly higher in the pre-pandemic group than in the pandemic group ($P=0.046$). The rate of blindness was

significantly higher in the pandemic group than in the pre-pandemic group (39.3% vs. 31.4, $P=0.006$).

We detected significant differences in the types of cataracts between the groups ($P=0.033$). The mixed-type cataract was more frequently seen in the pandemic group (54.2% vs. 48.0%), whereas the rate of posterior subcapsular cataracts was higher in the pre-pandemic group (8.6% vs. 4.4%). The other ocular findings were similar in the groups.

Discussion

It is a fact that the COVID-19 pandemic period has changed the routines in our lives. There are studies about cataract surgeries in this period.^[7-9] In this study, we aimed to compare and discuss the clinical characteristics of patients who underwent cataract surgery, which is an elective case, before and during the pandemic.

In our clinic, the number of cataract surgeries per year before and during the COVID period was 560 and 590, respectively. Some publications draw attention to the decrease in cataract surgeries during the COVID-19 pandemic.^[9] However, there are also publications reporting no difference in the number of cataract surgeries when looking at yearly data.^[10] The fact that our hospital is the referral hospital in the region and full-capacity surgery is performed before and after the pandemic may be a reason why the number of surgeries has not decreased. In addition, since no elective surgery was performed during the closure period in our study, this period was excluded from the study.

In the multicenter study of Das and Reddy, cataract surgeries were divided into three periods as pre-COVID, clo-

Table 3. Comparison of the pre-operative ocular findings between the groups

	Pre-pandemic group (n=560)	Pandemic group (n=590)	P
Side‡			
Right	289 (51.6)	325 (55.1)	0.262*
Left	271 (48.4)	265 (44.9)	
Best-corrected visual acuity†,§	0.163±0.148 0.100 (0.001–0.600)	0.130±0.132 0.100 (0.001–0.600)	<0.001**
P+P+ ‡	14 (2.5)	13 (2.2)	0.891*
Best-corrected visual acuity >0.01‡	126 (22.5)	161 (27.3)	0.071*
Best-corrected visual acuity >0.001‡	36 (6.4)	58 (9.8)	0.046*
Blindness‡	176 (31.4)	232 (39.3)	0.006*
Type of cataract‡			
Posterior subcapsular	48 (8.6) ^a	26 (4.4) ^b	0.033*
Nuclear	180 (32.1)	176 (29.8)	
Cortical	5 (0.9)	2 (0.3)	
Brown	6 (1.1)	11 (1.9)	
Mature	48 (8.6)	52 (8.8)	
Posterior polar	4 (0.7)	3 (0.5)	
Mixed type	269 (48.0) ^a	320 (54.2) ^b	
Total cataract (Brown+Mature)‡	54 (9.6)	63 (10.7)	0.629*
Pseudoexfoliation‡			
Positive	47 (8.4)	54 (9.2)	0.726*
Negative	513 (91.6)	536 (90.8)	

‡n (%); †mean±standard deviation; §median (min-max). a and b: Different letters showing significant differences between the groups; P+P+: Light perception and projection; *Pearson Chi-square, Fisher's exact, or Fisher-Freeman-Halton test; **Mann-Whitney U-test.

sure period, and the pandemic period, after which the closure ends. This study found fewer cases in the closure period compared to the pre-COVID period. The number of patients reached the pre-COVID level over time after the closure was over and even exceeded this number in the following period. Again in this study, the cases are younger in the closure period compared to the pre-COVID period. Pre-operative visual acuities of the patients were statistically lower in the closure period compared to the pre-COVID and post-closure periods. In this study, the rate of cases considered as blindness (20/1200 and light sensation) increased in the closure and post-closure period compared to the pre-COVID period. The total cataract rate also increased in the closure and post-closure period compared to the pre-COVID period.^[11] In our study, younger patients had cataract surgery compared to the pre-pandemic period during the pandemic period (the pre-pandemic group's median age is 69 and pandemic group's median age is 67 years, $P=0.046$). This difference may be related to reducing

the rate of older patients to admit to the hospital or accepting surgery due to the risk of COVID-19 infection.

Advanced cataract types, which we defined as total cataracts in our study, were not statistically different between the two periods, but they were higher in number during the pandemic period. In our study, the pre-operative BCVA was significantly lower during the pandemic than in the pre-pandemic period, as in Das and Reddy.^[11] In our study, the number of cases at the level of blindness accepted by the World Health Organization (0.01/0.001/p+) was significantly higher in the pandemic period than in the pre-pandemic period.^[12] This decrease in pre-operative BCVA can be attributed to the waiting period of the patients during the closure period or an increase in the hospital admission rate in those with more visual complaints compared to those with fewer complaints after the closure. A study conducted in the United States found an increase in patients who did not attend the planned ophthalmology examination during the pandemic. These missed vis-

its were found at the highest rate in elderly patients with a cataract diagnosis.^[13] A study investigated the causes of delayed cataract surgery during the pandemic period by questionnaire. According to the results of this study, while the first reason was a lack of eye health-care service nearby (44.2%), the fear of COVID-19 infection was the fourth place (23.4%).^[14]

Although there was no difference in the total number of cataracts between the two periods in our study, we can consider that there are hard and advanced cataracts in eyes with low pre-operative BCVA. The advanced cataract may be related to patients' waiting during the closure period. In addition, it has been shown that blood sugar regulation is further impaired and diabetic complications increase in diabetic patients during the pandemic period.^[15] For diabetic patients, blood sugar regulation disorder may have accelerated cataract progression. It was also emphasized that the increase in oxidative stress with COVID-19 infection and the increase in steroid use due to COVID-19 infection in this period might cause rapid progression of cataracts.^[16] Further studies are needed on this subject.

In the study of Bhalerao et al., cases who underwent cataract surgeries during April–July 2020 and April–July 2019 were evaluated retrospectively. In this study, younger patients were identified in cataract surgeries in 2020. In addition, although the number of brown, mature, and black cataracts is the same in 2020, they found the rates of these types of cataracts to be higher than in the previous year. It should be taken into account that there is a decrease in the number of surgeries in the evaluated months of 2020. They found an increase in the mid-dilated pupil rate in 2020, but it is not statistically significant.^[17] In our study, the presence of mid dilated pupil was not significantly different in surgeries during pre-pandemic and pandemic periods.

In our study, patients with diabetic retinopathy among patients who underwent surgery were significantly lower during the pandemic period. In the study of Bhalerao et al., the rate of cataract surgery in 2020 in patients with diabetes mellitus was lower compared to the previous year.^[17] Perhaps, there may be a decrease in the hospital admission rate or acceptance of surgery in patients with diabetes mellitus or diabetic complications due to the risk of COVID-19 infection. In a study conducted in our country, Firat compared the findings of the patients who applied to the ophthalmology clinic for 1 month during the closure period with the findings of the patients who applied to the clinic in the same month of the previous year. They found a reduction in applications to the clinic in 2020. The rate of

cataract diagnosis in patients applied to the ophthalmology clinic and the number of cataract surgeries during this month of the pandemic was also lower than the previous year's.^[18]

Another remarkable point in our study was that the number of traumatic cataracts increased significantly during the pandemic among patients who underwent surgery. This may be related to the rapid progression of visual complaints and/or more complaints of patients with traumatic cataracts. Considering that people tend to horticulture in lockdown during the pandemic, ocular traumas may have increased.

The limitations of our study are that our study was retrospective, pre-operative and post-operative complications, and post-surgical BCVA which were not evaluated.

Conclusion

Compared to the pre-pandemic period, patients who had cataract surgery during the pandemic were younger, and their pre-operative BCVA was lower. Although there was no difference in the number of total cataracts between the two periods in our study, we can say that patients with low BCVA had hard or advanced cataracts, and we encountered more difficult cataract surgeries.

Ethics Committee Approval: This study was approved by Hitit University Faculty of Medicine Ethics Committee (19.01.2021; 2022-05).

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