



Impact of COVID-19-Related Lockdown on Glaucoma Patients

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Abstract

Objectives: To analyze emergency and outpatient admissions by glaucoma patients during complete lockdown due to coronavirus disease 2019 (COVID-19) to assess the effect of pandemic-related complete lockdown on glaucoma patients.

Materials and Methods: This retrospective chart review included all glaucoma patients who were either examined and/or underwent emergency surgery between March 11, 2020 and May 31, 2020, a period of complete COVID-19-related lockdown in Turkey. The data were compared with data from patients seen during the same time period in 2019. Visual acuity and intraocular pressure data from patients examined after the lifting of the lockdown were also evaluated.

Results: According to Turkish Ministry of Health guidelines, only emergency examinations and surgeries could be performed during the 82 days of the COVID-19 lockdown. During this period, a total of 11 eyes of 10 patients were operated and 123 patients were examined in the outpatient clinic. During the same period in 2019, 122 surgeries were performed, 39 of which were emergencies. In the first 4 weeks after the lockdown ended, 163 patients were examined at the outpatient clinic and marked visual loss was detected in 10 eyes of 9 (5.5%) patients who did not attend follow-up visits due to the pandemic.

Conclusion: During the lockdown, emergency surgeries related to glaucoma decreased by 71.7% and marked visual loss was detected in 5.5% of the patients examined after the lockdown. These findings suggest that some patients were unable to present to clinics despite needing emergency care.

Keywords: COVID-19, glaucoma, glaucoma treatment

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Introduction

Lockdowns imposed because of the coronavirus disease 2019 (COVID-19) pandemic limited the care received by patients for many medical conditions. Governments, public health agencies, and health care professionals have evaluated methods to provide health care to all patients with non-COVID-19 diseases while simultaneously battling the pandemic itself. For glaucoma in particular, telemedicine practices were already in use prior to the outbreak because they offer patients easier access to glaucoma specialists. However, when the lockdown and movement restrictions started at the beginning of March 2020, both patients and glaucoma specialists, along with many other health care professionals, were caught unprepared for the drastic changes in circumstances.

To have a better understanding of the effect of the lockdown on glaucoma patients and thereby find feasible solutions for the problem, we reviewed the surgeries performed and outpatient visits in our glaucoma department during the 3-month COVID-19-related lockdown and compared the results with the same period in the previous year. We also analyzed data from patients who were examined in the first month after the end of the lockdown.

Materials and Methods

A retrospective chart review was performed in the glaucoma department of the Ege University Hospital Ophthalmology Clinic. All outpatient treatments and surgeries carried out between March 11 and May 31, 2020 were analyzed. These dates were chosen based on the days of movement restriction determined by the government and Ministry of Health of the Republic of Turkey. The number of surgeries performed, the mean age of surgical patients, the preoperative intraocular pressure (IOP) and best-corrected visual acuity (BCVA) of the operated eyes, and the number and mean age of outpatients during this period were compared with data from the corresponding period in 2019. Additionally, all outpatient treatments and surgeries carried out in the first month after the lockdown ended (June 1-30, 2020) were analyzed.

Primary outcome measures were the number of emergency operations in the lockdown period vs. the previous year and the number of outpatient examinations during lockdown. Secondary outcomes were the number of emergency surgeries and outpatient examinations in the first month after the lockdown and the number of eyes that had significant visual loss due to restrictions.

During the lockdown period, only emergency surgeries were performed and only patients with acute complaints were examined. The definition of emergency surgery was not changed compared to the pre-pandemic definition. Therefore, eyes in which target IOP could not be reached with medical or laser treatment and eyes with severe optic disc damage and high IOP at the first visit were considered eligible for emergency surgery. All appointments for non-emergency examinations were cancelled. At the glaucoma department where this study

was carried out, patients with advanced glaucoma with poor/borderline control of IOP, monocularly with severe optic disc damage in the only seeing eye, and history of intraocular surgery in the past month were classified as emergent cases and their appointments were not cancelled.

On June 1, 2020, when the official lockdown period ended in Turkey and the restrictions were eased, a return to the pre-pandemic order with precautions against disease spread was suggested. In our glaucoma department, emergency surgeries resumed and outpatient appointments were scheduled with 30-minute intervals between patients. Due to such time limitations, a triage system was needed to prioritize patients with end-stage and advanced glaucoma, patients with vision in only one eye, and patients with the lowest BCVA. BCVA was evaluated with Snellen chart and converted to logMAR. IOP measurements were obtained by Goldmann applanation tonometry (GAT). For disinfection of the GAT tips, 70% isopropyl alcohol was preferred as a protective measure against severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). All precautions were taken to protect both patients and staff from infection, as recommended.¹

The study was approved by the Institutional Ethics Review Board of Ege University, Turkey, and conducted in agreement with the tenets of the Helsinki Declaration. Each participant signed a written informed consent form for the use of their medical data.

Statistical Analysis

SPSS 18.0 (SPSS Inc., Chicago, IL, USA) was used for statistical analysis. Chi-square test and Mann-Whitney U test were used to compare variables between the groups, and $p \leq 0.05$ was considered to be statistically significant.

Results

During the lockdown period, 11 eyes of 10 patients (5 [50%] female, 5 [50%] male) met the criteria for emergency surgery and were operated. The clinical features of the eyes and the surgeries performed are presented in Table 1.

During the same period of 2019 (March 11-May 31), 122 eyes of 99 patients (37 [37.4%] female and 62 [62.6%] male) were operated. The mean age of the patients was 59.02 ± 24.01 years (range: 15 days-90 years), mean BCVA was 0.66 ± 0.96 logMAR (range: 0-3), mean preoperative IOP was 27.04 ± 10.5 mmHg (range: 2-54), and mean cup-to-disc ratio was 0.64 ± 2.3 (range: 0.2-1). Data from 2019 indicated that general anesthesia was used in 34 surgeries (27.9%) and local anesthesia was used in 88 surgeries (72.1%). Of the 122 eyes operated in the 2019 period, 39 eyes (31.9%) of 33 patients (12 [36.4%] female and 21 [63.6%] male) required urgent intervention. The mean age, mean IOP, mean BCVA, and type of anesthesia used in the emergency surgeries performed during the 2020 lockdown and the same period in 2019 are summarized in Table 2.

The number of emergency surgeries during the lockdown was decreased by 71.7% compared to the same time period in 2019. The ratio of patients operated under general anesthesia/

local anesthesia during lockdown was significantly higher than in the corresponding period of 2019 and after the lockdown was lifted in 2020 ($p=0.05$). The types of surgery performed and the number of eyes operated in each time period are summarized in Table 3.

A total of 123 patients were examined in the outpatient glaucoma clinic during the lockdown. All of them were examined either because of acute-onset symptoms or because their conditions were considered emergent and their appointments were not cancelled. In the first 4 weeks after the end of the

Table 1. Clinical features of operated eyes and types of surgeries performed during lockdown period

Eye no.	Age/gender	Diagnosis	Preop BCVA (logMAR)	Preop IOP (mmHg)	Indication for surgery	Anesthesia	Surgery
1	91/F	Phacolytic glaucoma	2.8	32	High IOP	Local	Phaco-IOL
2	81/M	Absolute glaucoma	3	50	Severe pain	General	Evisceration
3	50/M	Neovascular glaucoma	1.8	62	High IOP	Local	Cyclodestruction
4	10/M	Uveitic glaucoma with mature cataract	2.8	17	Very low BCVA in only seeing eye	General	Phaco-IOL
5	10/M	Uveitic glaucoma with bleb failure	2.3	27	High IOP	General	Bleb needling
6	54/M	Glaucoma after keratoplasty	1.3	29	High IOP	General	Cyclodestruction
7	53/F	Uveitic glaucoma with IOL dislocation	1.3	12	Endothelial decompensation	Local	IOL repositioning
8	90/F	Phacomorphic glaucoma	2.8	30	High IOP	General	Phaco-IOL
9	46/M	Glaucoma after keratoplasty	2.8	39	High IOP	Local	Cyclodestruction
10	44/F	Angle closure glaucoma with bleb failure	0	36	High IOP	Local	Bleb needling
11	46/F	Primary angle-closure glaucoma	0.1	28	Acute increase in IOP	Topical	Laser iridotomy

F: Female, M: Male, Preop: Preoperative, BCVA: Best corrected visual acuity, IOP: Intraocular pressure, Phaco-IOL: Phacoemulsification and intraocular lens implantation, F: Female, M: Male

Table 2. Mean age, preoperative IOP, preoperative BCVA, and type of anesthesia used for emergency surgeries performed during the lockdown period in 2020 and the corresponding period in 2019

	During lockdown (11 March-31 May 2020)	Previous year (11 March-31 May 2019)	P value
Age, years; mean \pm SD (range)	52.27 \pm 26.0 (10-91)	44.36 \pm 7 (0.04-84)	0.9*
Preoperative IOP, mmHg; mean \pm SD (range)	32.9 \pm 13.3 (17-62)	29.24 \pm 10.49 (6-54)	0.5*
Preoperative BCVA, logMAR; mean \pm SD (range)	1.42 \pm 1.05 (3-0)	1.14 \pm 1.08 (2.8-0)	0.09*
Preoperative c/d; mean \pm SD (range)	0.89 \pm 0.16 (0.5-1)	0.83 \pm 0.20 (0.3-1)	0.47*
Anesthesia (n, %)			
General	5 (45.4)	14 (34.15)	0.05**
Local	6 (54.6)	27 (65.85)	

BCVA: Best corrected visual acuity; c/d: Cup-to-disk ratio, IOP: Intraocular pressure, SD: Standard deviation, *Mann-Whitney U test, **Chi-square test

Table 3. Types and numbers of emergency surgeries performed during the lockdown of 2020 and the corresponding period in 2019

Surgery type	During lockdown (11 March-31 May 2020)	Previous year (11 March-31 May 2019)
Phaco-IOL implantation	3	6
Trabeculectomy	0	9
Deep sclerectomy	0	0
Cyclodestruction	3	5
Bleb needling	2	3
Trabeculectomy + phaco-IOL	0	2
IOL repositioning	1	0
Drainage device revision	0	3
AC irrigation	0	2
Pupilloplasty	0	1
Laser iridotomy	1	8
Evisceration	1	0
Total	11	39

Phaco: Phacoemulsification, IOL: Intraocular lens, AC: Anterior chamber

lockdown, 163 outpatients were seen, of whom 12 patients (7.36%) required urgent surgery (14 eyes in total). The mean age of the operated patients was 52.8 ± 15.7 years (range: 21-76), the mean preoperative IOP was 30.4 ± 10.9 mmHg (range: 16-60), and the mean preoperative BCVA was 1.71 ± 1.07 logMAR (range: 2.8-0.0). Three (21.4%) of these eyes were operated under general anesthesia, while local anesthesia was used in 11 eyes (78.6%).

During this period, we observed that 10 eyes of 9 patients (5.5%) with advanced glaucoma had a marked loss of vision (at least 2 logMAR lines decrease) since their last visit. All of these patients were diagnosed with open-angle glaucoma. The mean age of these patients was 56.1 ± 22.8 years (range: 18-76). Their mean BCVA was significantly decreased from 0.78 ± 0.34 logMAR at the pre-lockdown visit to 2.09 ± 0.62 logMAR at the post-lockdown visit. Additionally, the mean IOP of the patients was markedly increased from 20.5 ± 5.3 mmHg pre-lockdown to 28.1 ± 7.2 mmHg post-lockdown. Seven eyes (70%) of 6 patients had progressed to absolute glaucoma (all had BCVA ≤ 2.1 logMAR). Of these patients, 4 had an appointment for examination and 2 were scheduled for surgery during the lockdown period. All 6 patients failed to attend their appointments, either because they were afraid to come to the hospital due to the risk of COVID-19 infection or were of advanced age (2 patients were over 70 years old). The older patients were living alone and needed assistance from their family to reach the hospital, but these family members had deemed it too risky to take the patients to the hospital. During the lockdown, one patient progressed to absolute glaucoma in both eyes and suffered from a delirium-like condition, while 3 patients suffered a loss of vision in their only seeing eye. The 3 patients whose appointments were rescheduled to after the lockdown experienced symptoms such as decreased vision and

ocular pain during the lockdown but opted to wait for their appointments and not leave the house for a non-life-threatening condition. One of these patients lost most of her visual field in her only seeing eye, with only the central 5 degrees or less remaining, although the BCVA (0.7 logMAR) remained unchanged.

Discussion

The ongoing COVID-19 pandemic continues to severely limit the medical care that patients can receive for chronic diseases. Among ophthalmology patients, we observed that glaucoma patients required emergency care the most since the start of the pandemic. Du et al.² also reported in their letter that glaucoma surgeries were the most commonly performed ophthalmic surgeries during the outbreak in Wuhan city.

In the current study, we observed that the number of emergency glaucoma surgeries conducted during the COVID-19 lockdown was significantly lower than the number of emergency surgeries performed in the same time period in 2019, but was similar to the number of surgeries performed after the end of the lockdown. The reason for this is probably a reduction in routine examinations and the hesitation of the patients to travel to the hospital. Preoperative BCVA and preoperative IOP did not differ significantly between the lockdown in 2020 and the same period in 2019 or the first month after the lockdown was lifted. This was predictable because the criteria for emergency operations remained unchanged. The criteria for emergency surgeries were also consistent with the guidelines of the American Academy of Ophthalmology.³

Even though local anesthesia was used as often as possible since the start of the COVID-19 outbreak, the percentage of patients who were operated under general anesthesia during the lockdown was significantly higher than in the previous year or after the lockdown was lifted. A closer look at each patient who

was operated under general anesthesia during the lockdown showed that 2 eyes belonged to a pediatric patient, 1 patient underwent evisceration, 1 patient had dementia, and 1 patient had panic disorder. Although the exact reason for such a high number of uncooperative patients during lockdown remains unclear, the most likely explanation is that their compliance to medical treatment was poor, especially in terms of self-administering eye drops. The IOP values in these eyes were thus worse and the need for surgery was urgent.

The fact that some patients had reduced visual acuity during the lockdown compared to pre-lockdown period was not surprising. However, the real surprise was the common features of the eyes that presented with a decrease in vision. Eyes with poorly monitored IOP and severe optic disc damage were expected to show decreased vision. Anticipating this, these patients were followed-up closely and were examined in regular visits with treatment updates when necessary. Patients who had red/painful eyes or a sudden decrease in vision also presented to the glaucoma clinic and received the necessary medical care. However, the eyes that had moderate to advanced glaucoma with well- to borderline-controlled IOP deteriorated the most during the lockdown period. These patients were not prioritized in our triage system, and the patients themselves were not that anxious to have their IOP monitored. Additionally, half of the patients who lost their vision during the lockdown period had open-angle (primary or exfoliation) glaucoma. Because of the insidious nature of open-angle glaucoma, the patients did not seek medical care until they suffered from acute symptoms. IOP started to increase in these eyes and the optic disc was already damaged by the time the patient felt the need to consult their ophthalmologist.

Ophthalmologists have always emphasized the importance of making regular visits to glaucoma specialists easier for glaucoma patients.⁴ Telemedicine has long been a focus of these discussions. This pandemic brought attention to the need to improve every aspect of care for glaucoma patients.⁵ The current study revealed the shortcomings of our triage system. Nonetheless, all glaucoma patients in our system were called and advised to seek medical care in the event of acute ocular symptoms or concerns regarding their treatment, even during the lockdown. The lower number of emergency surgeries since the start of the pandemic and the fact that some people suffered a loss of vision during the lockdown period suggest that some patients who required emergency intervention simply did not seek medical care. Regardless of whether this is due to a defect in our triage system or patients' anxiety about potential exposure to COVID-19, solving this problem should be a priority.

Conclusion

In our opinion, telemedicine in its current state is inadequate for emergent conditions during a pandemic. Routine examination by family practitioners or local ophthalmology clinics during the pandemic may still be deemed risky for vulnerable patients, and these doctors are already highly overworked because of the pandemic. A report by Husain et al.⁶ described the presence of

local investigation units in Singapore which are located within the community and are staffed by technicians. While this is an attractive option for some countries, most countries do not have enough staff to for such units. Patients may still hesitate to attend their appointments in these local clinics. Additionally, the results of our study indicate that the patients who are at the highest risk of loss of vision still need to consult a glaucoma specialist. A triage system that will cover every patient and not miss any potential vision loss is difficult to create and requires time and experience to ensure that mistakes are not made. Bommakanti et al.⁷ suggested a triage system in which the patients' glaucoma severity-progression risk score and COVID-19 morbidity risk score are calculated. While this scaling system seems reasonable and feasible, additional research is needed to determine whether it will lead to better clinical outcomes and patient adherence. It seems like a combination of telemedicine, a strong triage system, and educating the patients about their disease might provide the best outcomes in terms of reduced progression of glaucoma, less spread of disease, and minimum loss of vision.

Ethics

Ethics Committee Approval: Ege University Medical Research Ethics Committee (decision no: 20-10.1T/25 date: 15.10.2020).

Informed Consent: Retrospective study.

Peer-review: Externally peer reviewed.

Authorship Contributions

Surgical and Medical Practices: S.G.Y., H.A., Concept: M.E.B., Design: M.E.B., Data Collection or Processing: M.D.Ç., Analysis or Interpretation: S.G.Y., M.E.B., Literature Search: M.D.Ç., M.E.B., Writing: M.E.B.

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