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ORIGINAL ARTICLE / ОРИГИНАЛНИ РАД

The impact of COVID-19 pandemic and national lockdown on the surgical care of ophthalmic patients in a tertiary health care institution

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SUMMARY

Introduction/Objective World Health Organization in January 2020 declared a pandemic of the coronavirus disease named COVID-19. The state of emergency in the Republic of Serbia began on March 15 2020, which greatly influenced the treatment of those patients who were not affected by COVID-19. The aim of this paper is to compare the most common ophthalmic surgeries during quarantine with those performed in 2019 in the same period.

Methods This is a retrospective study. We collected data from the operating protocol of the main ophthalmic operating room. We have followed the changes related to surgical procedures during these two years.

Results During the state of emergency, significantly more operations were performed on male patients than on female patients compared to the same period in 2019 ($p = 0.043$). In the observed period, in 2019 significantly more patients older than 65 were surgically treated ($p < 0.001$). During 2019, there were 397 (64.3%) elective and 220 (35.7%) urgent procedures, while for the same period next year there were 9 (9.1%) elective and 90 (90.9%) urgent procedures. Significantly more urgent interventions were performed during 2020 compared to 2019 ($p < 0.001$).

Conclusion The coronavirus pandemic has led to numerous changes in the treatment of ophthalmic patients. Many patients did not have access to adequate treatment, which certainly led to the impairment of many ophthalmic diseases.

Keywords: COVID-19; quarantine; operations; ophthalmology

INTRODUCTION

In the last days of 2019, the Chinese health authorities reported to the World Health Organization the occurrence of few cases of respiratory infections in people in Wuhan. The coronavirus (SARS-Cov-2) was identified as the causative agent of the disease, while the disease was named COVID-19 [1, 2]. Rapid spread of the virus around the world resulted in a global public health threat, and COVID-19 reached the level of a pandemic in March 2020 [1, 2]. In Serbia, the first case of coronavirus was recorded on March 6, 2020 [3], while on March 15, 2020, a state of emergency was declared. In an attempt to limit the spread of this severe respiratory disease, the movement of citizens, especially the vulnerable part of the population (citizens over 65), is limited, online teaching in schools and colleges is introduced, work from home is proposed and many social, service and cultural facilities are closed. These measures were abolished on May 6, 2020 [3].

In addition to these restrictions, the state of emergency distressed the functioning of health facilities and the treatment of a large number of patients who were not primarily affected by COVID-19. Lack of resources and health staff, limited movement of patients and potential fear of infection, have led to the progression of many ophthalmic diseases [4]. Also, during the first few months of the pandemic, most ophthalmology departments postponed their elective activities and limited their practice to emergencies only [5]. The American Academy of Ophthalmology (AAO), the world's largest organization of ophthalmologists, recommended on March 18, 2020, that ophthalmologists stop performing all interventions that are not urgent. In addition, the AAO published a list of emergency ophthalmic surgeries [6]. These recommendations have led to a decrease in the number of patients visited and surgically treated compared to the period before the pandemic [7].

The aim of our research is to present the most common ophthalmic interventions performed during the state of emergency in the Republic of Serbia, declared due to the COVID-19 pandemic, as well as to compare them with procedures performed in the same period last year. With the help of this study, we want to provide a preliminary insight into the consequences of the COVID-19 pandemic and its impact on the treatment of ophthalmic patients.

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METHODS

This retrospective study was conducted at the Eye Clinic, University Clinical Center of Serbia in Belgrade. The period of monitoring ophthalmological patients was from March 15 to May 6, 2020, during the state of emergency in the Republic of Serbia, as well as in the same period in 2019. Surgical protocols from the main ophthalmologic operating room were used as a data source. The collected data include the age and sex of the patients, diagnosis, type of surgery, urgency of their condition and the correlation of these parameters. We divided the patients into four age groups (18 and younger, 18–44, 45–64 years and 65 and older). We divided surgical procedures into urgent and elective according to AAO criteria [6]. The procedure was considered urgent if postponing the operation for 10 days or more would lead to significant loss of vision or reduced chances of recovery. Diagnoses are divided into the following groups: vitreoretinal diseases, trauma, eye infections, eye tumors, cataracts, changes in the eyelids, conjunctiva, tear ducts and cornea, exudative maculopathies, strabismus and other diagnoses. Similarly, we divided operations into the following categories: vitreoretinal surgery, trauma, eye infections, eye tumors, cataract surgery, eyelid, conjunctival and tear duct surgery, corneal surgery, intravitreal injections, strabismus surgery and others [4]. All vitreoretinal surgeries were classified in one category, except those performed due to trauma, which we classified in the category of the same name. This study was undertaken according to the tenets of Helsinki Declaration and approved by the hospital's Ethical Committee.

The outcomes we followed are the differences we found comparing the results from the same period of these two years, which are related to surgical treatment.

Statistical analysis

The description of the categorical variables was performed by using an absolute and relative number in the form n (%). The categorical variables were compared using the χ^2 test – contingency table. Continuous variables are displayed as mean value and standard deviation and were compared using the Mann–Whitney test (with the assessment of the distribution normality). The result was considered statistically significant for the selected level of significance from 0.05. Statistical analysis was performed using the IBM SPSS Statistics for Windows, Version 21.0 (IBM Corp., Armonk, NY, USA).

RESULTS

The total number of surgically treated patients from March 15 to May 6, 2019 was 617, while for the same period in 2020, during the state of emergency declared due to the COVID-19 pandemic, that number was 99 patients. The average age of treated patients in 2019 was 57.5 ± 22.4 years, while in 2020 it was 39.3 ± 26.6 years, which showed a statistically significant difference ($p < 0.001$). In the observed period in 2019, 338 (54.8%) male patients and 279 (45.2%) female patients were operated, while in the same period next year, 65 (65.7%) male patients and 34 (34, 3%) female patients underwent surgery. A statistically significant difference was found in the number of surgically treated male and female patients in the observed period in 2019 compared to the same period in 2020 ($p = 0.043$). During the state of emergency in 2020, significantly more operations were performed on male patients than on female patients compared to the same period in 2019 (Table 1). There was a statistically significant difference in the age distribution of patients during the same period in 2019 and 2020 ($p < 0.001$). In the observed period, in 2019 significantly more patients older than 65 were surgically treated, while in 2020, more patients younger than 18 were operated on (Table 2).

Table 1. Sex distribution of surgically treated patients during the examined periods in 2019 and 2020

Sex, n (%)	The year of the surgical treatment		p*
	2019	2020	
Male	338 (54.8)	65 (65.7)	0.043
Female	279 (45.2)	34 (34.3)	

*for the level of significance of 0.05

Table 2. Age distribution surgically treated patients during the examined periods in 2019 and 2020

Age groups, n (%)	The year of the surgical treatment		p*
	2019	2020	
18 and younger	62 (10)	32 (32.3)	< 0.001
18–44 years	68 (11)	11 (11.1)	
45–64 years	183 (29.7)	39 (39.4)	
65+ years	304 (49.3)	1 (17.2)	

*for the level of significance of 0.05

During 2019, there were 397 (64.3%) elective and 220 (35.7%) urgent procedures, while for the same period next year there were nine (9.1%) elective and 90 (90.9%) urgent procedures. There was a statistically significant difference in the type of surgeries performed during 2019 and 2020. Significantly more urgent interventions were performed during 2020, and more elective interventions were performed during 2019 ($p < 0.001$) (Figure 1).

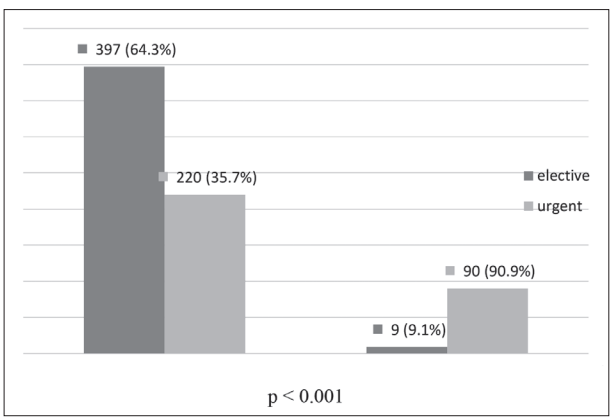


Figure 1. Types of surgeries performed during 2019 and 2020

In the study period in 2019, the patients were most often referred for surgical treatment of cataracts, 148 (24%), followed by 129 (21%) for the treatment of changes on the eyelids and 87 (14%) due to eye tumors, while in the same period in 2020, the patients were most often referred for the trauma treatment, 39 (39%) of them, followed by 23 (23%) due to eye tumors and 19 (19%) due to vitreoretinal diagnoses. In the observed period in 2020, no patient was referred for treatment of changes on the eyelids, conjunctiva and tear ducts, cornea, exudative maculopathy or strabismus. During 2020, there was a statistically significant increase in vitreoretinal diagnoses, trauma and eye tumor surgeries, while in 2019 there were significantly more cataracts. In both years, vitreoretinal diagnoses, eye trauma, eye infections, eye tumors, cataracts and glaucoma were present in the study period (Table 3).

Table 3. Refferal diagnoses that led to surgical intervention during the examined periods in 2019 and 2020

Refferal diagnoses	Year		p*
	2019	2020	
Vitroretinal diagnoses	69 (11.2)	19 (19.2)	**0.024**
Traumas	36 (5.8)	39 (39.4)	**< 0.001**
Eye infections	12 (1.9)	5 (5.1)	0.060
Eye tumors	87 (14.1)	23 (23.2)	**0.014**
Cataracts	148 (24)	7 (7.1)	**< 0.001**
Glaucoma	23 (3.7)	3 (3)	0.731
Eye lids	129 (20.9)	0	**< 0.001**
Conjuctivas and tear ducts	20 (3.2)	0	0.069
Corneas	18 (2.9)	0	0.085
Exudative maculopathy	48 (7.8)	0	**0.004**
Strabismus	20 (3.2)	0	0.069
Other	7 (1.1)	3 (3)	0.136

*For the level of significance of 0.05

Table 4. Ophthalmological surgeries performed during the examined periods in 2019 and 2020

Ophthalmological surgeries	Year		p*
	2019	2020	
Vitroretinal surgeries	68 (11)	19 (19.2)	**0.021**
Eye trauma surgeries	36 (5.8)	39 (39.4)	**< 0.001**
Eye infection surgeries	6 (1)	5 (5.1)	**0.002**
Eye tumor surgeries	87 (14.1)	14 (14.1)	0.991
Cataract surgeries	149 (24.1)	7 (7.1)	**< 0.001**
Glaucoma surgeries	23 (3.7)	3 (3.0)	0.731
Eye lid surgeries	129 (20.9)	0	**< 0.001**
Conjuctivas and tear ducts surgeries	26 (4.2)	0	**0.037**
Cornea surgeries	18 (2.9)	0	0.085
Intravitreal injections	48 (7.8)	0	**0.004**
Strabismus interventions	20 (3.2)	0	0.069
Other	7 (1.1)	12 (12.1)	**< 0.001**

*For the level of significance of 0.05

When it comes to surgeries, in the examined period in 2019, cataract surgeries were most often performed, [149 (24.1%)], followed by eyelid surgeries [129 (20.9%)] and eye tumor surgeries [87 (14.1%)]. In the same period in 2020, surgeries due to eye trauma were the most frequently performed [39 (39.4%)], vitreoretinal surgeries [19 (19.2%)] and eye tumor surgeries[14 (14.1%)].

During the examined period in 2020, there were no operations on the eyelids, conjunctiva and tear ducts, cornea, there were no intravitreal injections and strabismus operations. Significantly more vitreoretinal surgeries, eye trauma surgeries and operations due to eye infections were performed, while in 2020 there were significantly fewer cataract surgeries (Table 4).

DISCUSSION

The COVID-19 pandemic has shown a significant impact on the health system, affecting patients' ability to access emergency and elective care, reducing the number of surgeries, hospital admissions and clinic examinations [8]. Providing emergency surgical care in the early days of the COVID-19 pandemic was a unique challenge for surgeons. New factors, such as perioperative testing for SARS-CoV-2, the availability of adequate personal protective equipment, have overgrown traditional paradigms of surgical care [9]. Also, the COVID-19 pandemic has led to extensive quarantines around the world that have restricted the movement of billions of people [10]. The Eye Clinic of the University Clinical Centre Serbia, as a tertiary ophthalmological center with an emergency service that works 24 hours a day, has remained open for patients who need urgent ophthalmological care. The results of our research showed a significant difference in the care of ophthalmic patients during the state of emergency in the Republic of Serbia compared to the same period last year. With a large volume of elective procedures, ophthalmology was severely affected by the COVID-19 pandemic, losing almost 80% patients volume in March and April 2020 [8].

The average age of patients who were treated surgically during the state of emergency was significantly lower compared to the same period in 2019. This is most likely a consequence of the limited movement of citizens over the age of 65 who were most at risk from COVID-19, as well as citizens' fear of potential infection. Similar results were presented by dell'Omo et al. [4]. Pellegrini et al. [11] concluded that both surgeons and patients who were involved in surgical treatment were statistically significantly younger in April 2020 compared to April 2019.

Also, there was a statistically significant difference in sex distribution. Our study showed that there were more male patients than female operated on during the state of emergency in 2020, compared with the previous year, which is in line with research conducted by Pellegrini et al. [11] and Babu et al. [12]. This difference could be influenced by the fact that mostly women stayed at home to take care of children when schools were closed, so there was less chance of them getting sick or injured [8, 12].

Our study showed a difference in the distribution of surgically treated patients in different age groups. Children and adolescents were operated more often during the state of emergency, which was not the case according to the study of Pellegrini et al. [11] who noticed a decrease in representation of this age group. According to the study conducted by Babu et al. [12] there was an increase in the

prevalence of patients younger than 60 years during the state of emergency, which is in line with our research. In our study, a statistically significant decrease in the number of patients older than 65 was noticed during 2020, which is a consequence of the restrictions on the movement of this part of the population during the state of emergency in the Republic of Serbia.

The number of operations performed during the state of emergency was significantly lower compared to the same period in 2019, with a notable decline in elective interventions. This could be due to restrictions imposed during the state of emergency, such as recommendations to stay at home and limited movement at certain times of the day, which is in line with previously published studies [8, 11, 12, 13]. Although in 2020 the total number of operations decreased compared to the previous year, both elective and emergency, we noticed a large difference in the types of operations performed. During 2019, the largest number of operations performed were elective interventions, while in 2020 there were mostly emergency interventions that, if delayed, could lead to vision loss This data is in accordance with the measures envisaged during the state of emergency, as well as with the recommendations of the AAO [6]. Most elective interventions were postponed during the state of emergency, but a small number of these operations was performed which coincides with the results of other studies [4, 11, 12].

Cataract is one of the most common ophthalmic diseases in adults over the age of 50, and cataract surgery is the most common elective operation in developed countries [4]. Our study showed a statistically significant decrease in the number of these operations in the observed period, which was the most common operation in 2019, while in 2020 this number was significantly lower, as shown by studies by other authors [4, 12, 14]. Retinal detachment is an emergency that requires urgent intervention. In our study, we noticed a statistically significant decrease in these interventions, although in percentages they were more frequent in 2020 than in 2019. Similar results were presented by other authors [4, 11], explaining this as the reluctance of patients to risk exposure to the coronavirus in healthcare facilities. Eye tumor surgeries, which fall under emergency interventions, did not show a statistically significant difference in the number of operations performed in the observed period of both years. Eye trauma is an emergency in ophthalmology. Our study showed that the number of these cases increased in the observed period in 2020 compared to the previous year, and that this is far the most common surgical intervention performed during the state of emergency, probably because of the do-it-yourself tasks. On the other hand, dell'Omo et al. [4] concluded that the number of trauma cases decreased, which they had explained by limited outdoor activities, while Abdullatif et al. [13] in their study concluded that the number of trauma cases did not change compared to the pre-pandemic era.

Surgical treatment of many conditions was not performed during the state of emergency, and that includes operations on the eyelids, conjunctiva and tear ducts, cornea, strabismus, etc. These conditions are not classified as urgent and as such may be deferred, in accordance with AAO guidelines [6].

The limitation of this study is that it was conducted in one clinical center, so that these results cannot be generalized to others, although the Eye Clinic of the University Clinical Center of Serbia covers the entire territory of the Republic of Serbia. As a source of data, we used the operating protocol of the main operating room and compared the differences between the examined periods in 2019 and 2020. The other two protocols, from the day hospital for cataract surgery and the small operating room, were not used because the rooms were closed during the state of emergency, which may affect the data as a whole during the period under review in 2019. In future studies, we plan to include protocols from all three operating rooms to provide more detailed insight. In addition, we do not have data from private ophthalmology clinics in our study. Despite the limitations, we believe that our study provides valid information for further clinical research on the impact of the pandemic on the treatment of ophthalmic patients.

CONCLUSION

The coronavirus pandemic has led to numerous challenges in the daily care of ophthalmic patients. Many patients did not have access to adequate treatment, which certainly led to the impairment of many ophthalmic diseases. Many changes in practice during this pandemic will take place and become part of the new normal after the COVID-19 pandemic. With the help of new knowledge and studies, medical workers can prepare to deal with the consequences of the pandemic and they can plan safe, effective, and comprehensive protocols for the future.

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Conflict of interest: None declared.

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Утицај пандемије ковида 19 и ванредног стања на хируршко збрињавање офталмолошких пацијената у терцијарној офталмолошкој установи

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САЖЕТАК

Увод/Циљ Светска здравствена организација је у јануару 2020. прогласила пандемију болести коју изазива вирус корона под називом ковид 19. Ванредно стање у Републици Србији почело је 15. марта 2020. године, што је у великој мери утицало на лечење оних пацијената који нису били заражени ковидом 19.

Циљ овог рада је да се упореде најчешће офталмолошке операције током карантина са онима које су обављене 2019. године у истом периоду.

Методе Ово је ретроспективна студија. Прикупили смо податке из оперативног протокола главне офталмолошке операционе сале. Пратили смо промене у вези са хируршким захватима током ове две године.

Резултати Током ванредног стања урађено је значајно више операција на пацијентима мушког пола него женског у односу на исти период 2019. године ($p = 0,043$). У посматраном периоду, у 2019. години је хируршки лечено значајно више пацијената старијих од 65 година ($p < 0,001$). Током 2019. године било је 397 (64,3%) изборних и 220 (35,7%) хитних поступака, док је за исти период наредне године било 9 (9,1%) изборних и 90 (90,9%) хитних поступака. Током 2020. године обављено је значајно више хитних интервенција у односу на 2019. годину ($p < 0,001$).

Закључак Пандемија ковида 19 довела је до многих промена у лечењу офталмолошких пацијената. Многи пацијенти нису имали приступ адекватном лечењу, што је сигурно довело до погоршања многих офталмолошких болести.

Кључне речи: ковид 19; карантин; операције; офталмологија