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ORIGINAL ARTICLE

The impact of covid-19 pandemic on diagnosing and treating adult patients with glaucoma in Serbia

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Summary

Aim. The aim of this study is to summarize the continuity of diagnostic procedures and surgical treatment of patients with glaucoma during the first two years of COVID 19 pandemic in a tertiary ophthalmology center of the Republic of Serbia - the Clinic for Eye Diseases of the University Clinical Center of Serbia, and to compare the results with those from the period before the pandemic was declared.

Material and methods. In this retrospective study, we collected data from the protocol of performed diagnostic procedures –visual field testing, optical coherence tomography and clinical examinations, as well as from the protocol from the operating theatre.

Results. The number of examined patients, the number of diagnostic procedures related to glaucoma, as well as the number of laser interventions (Nd: Yagiridotomies) and glaucoma surgeries (trabeculectomy) decreased from 20% to 66% during the period of COVID-19 pandemic.

Conclusions. COVID-19 pandemic has led to a drastic reduction in the number of examinations, laser interventions and surgeries in the category of people suffering from glaucoma.

Keywords: COVID-19, pandemic, glaucoma

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INTRODUCTION

COVID-19 pandemic has an impact on practically every person in the world, on potential or actual patients, and medical professionals (1). Apart from the changes it brought to our everyday life, the field of providing health services has also changed drastically - the majority of diagnostic procedures for chronic diseases, as well as procedures during follow-up of already diagnosed patients, were put on hold. The majority of surgeons worldwide temporarily stopped performing elective surgeries. All this, along with the specificities of the specialty, affected ophthalmology as well.

One of the most prevalent eye diseases in the world is glaucoma – a chronic optic neuropathy characterized by slow degeneration of retinal ganglion cells resulting in deterioration of visual function, and the third most prevalent cause of preventable blindness worldwide (2).

The aim of this study is to present and analyze data related to the diagnosis and treatment of people suffering from glaucoma during the first two years of COVID-19 pandemic in Serbia, in order to try to overcome the consequences, and to get prepared for possible future similar events.

MATERIAL AND METHODS

This retrospective study was conducted at the Clinic for Eye Diseases of the University Clinical Center of Serbia in Belgrade. We extracted the data from Heliant healthcare information system, for the period of two years before the pandemic was declared, and for the period of two years during the pandemic (2018,2019, 2020, 2021).The data on the number of visual field testing (VF), optical coherence tomography of the optic nerve head (OCT) and clinical examination in Glaucoma clinic, along with the number of laser glaucoma treatments (Nd: Yagiridotomies) and surgeries (trabeculectomy) were analyzed.

The outcomes we followed are the differences we found comparing the results from the same time of these two periods (the years 2018 and 2019 versus the years 2020 and 2021), but since the samples gathered in 2018 and 2019 did not differ significantly from each other (p=0.0001) for any of the collected variables, only the data related to 2019 were considered for statistical analysis.

The study was approved by the Clinic's Ethical Committee. All data were collected anonymously and according to the tenets of the Declaration of Helsinki. Patients at the admission to the Clinic for Eye Disease signed the informed consent for any surgical treatment and data processing.

Statistical analysis. Descriptive results were reported in the form of percentage for categorical variables and as mean±Standard Deviation (SD) for quantitative ones. Chi-Square test and T test for independent means were used, respectively, to compare categorical and quantitative variables between the two periods. The analysis was done using STATA 16.0 (StataCorp, Texas, USA). Statistical significance was considered for the selected level of significance from 0.05.

RESULTS

Between January 1th, 2020 and December 31th 2020, 102 glaucoma surgeries (trabeculectomies) were performed compared to 172 surgeries carried out during the previous year, in the period before the pandemic. Therefore, the surgical volume of glaucoma dropped by 40.7% in the first year of the pandemic. As for the year 2021, the drop of glaucoma surgeries was even higher (56.5%). The drop in the number of diagnostic procedures ranged from 21% to 51%. Results are shown in **Table 1**, **Table 2** and **Figure 1** and **Figure 2**.

Table 1. Number of diagnostic procedures, laser interventions and glaucoma surgeries in pre-pandemic 2019, and pandemic 2020, 2021

	Before pandemic 2019	During pandemic 2020	During pandemic 2021	P
Clinical examination	6199	2106	2129	<0.0001
Visual field testing	9371	4528	4535	<0.0001
Optical coherence tomography	5606	3349	4422	<0.0001
Laser iridotomy	524	286	241	<0.0001
Trabeculectomy	172	102	77	<0.0001

DISCUSSION

The general impression is that COVID-19 pandemic has significantly worsened global health.

Extended lockdowns and the cease of routine outpatient visits led to a multi-layered deterioration of the health of our patients suffering from glaucoma (3). The extent of glaucoma problem during the pandemic in terms of how many people it affected can be estimated based on the facts that it is predicted that the number of adults with glaucoma will reach 112 million by 2040 (4, 5). There are no reliable data on the prevalence of glaucoma in Serbia, since this disease is not subject to mandatory reporting, but we assume that currently around 150.000 people suffer from glaucoma. Glaucomatous visual field loss may significantly affect functional daily living activities, as reading, driving, and everyday household activities. Unfortunately, most of glaucoma cases do not present with signs and symptoms that patients can recognize, so this is a disease that must be actively looked for, with regular examinations of people who are at risk of getting it (ophthal-

Table 2. Variation in the number of diagnostic procedures, laser interventions and glaucoma surgeries in pre-pandemic 2019, and pandemic 2020, 2021

	Variation 2019/2020	Variation 2019/2021	P 2019/2020	P 2019/2021
Clinical examination	-66.03	-65.66	<0.0001	<0.0001
Visual field testing	-51.68	-51.61	<0.0001	<0.0001
Optical coherence tomography	-40.29	-21.12	<0.0001	<0.0001
Laser iridotomy	-45.42	-54.01	<0.0001	<0.0001
Trabeculectomy	-40.7	-56.5	<0.0001	<0.0001

mological examination with intraocular pressure measurement, VF testing, and OCT). Having that in mind, we can assume the depth and complexity of the problems associated with glaucoma and COVID-19 pandemic.

The state of emergency in the Republic of Serbia lasted from March 15 to May 6, 2020, but the disruption in the daily functioning of the health service lasted much longer, and only emergency ophthalmological cases were treated during 2020 and 2021 (6). The "first wave" of COVID-19 pandemic in Serbia led to mobilization of medical staff (both doctors and nurses) exclusively for the management of COVID-19 patients. Ophthalmologists and ophthalmic and scrub nurses, including all authors of this study, were transferred to specialized COVID-19 institutions, which resulted in cancelling and rescheduling of elective surgical procedures. Only ophthalmological emergencies were treated, since the ophthalmological services in Serbia followed WHO recommendations given in the early months of 2020 that ophthalmologists should stop performing all interventions except for the urgent ones (7). Furthermore, ophthalmic staff was at high risk of contracting the infection due to very close distance (8) but from ophthalmologists' point of view, the greatest harm was done to our chronic patients, who during the pandemic and lockdown could not be followed-up regularly. The consequences that the COVID-19 pandemic has left on the diagnosis and follow-up of glaucoma patients will probably be felt to the full extent in the future. Glaucoma patients need to have regular follow-up examinations for the rest of their lives, their treatment regimen often has to be adjusted, and they have to go through periodical visual field testing and imaging procedures of their optic nerve heads. In addition, they need to be constantly reminded of the importance of regular instillation of eye drops to lower the eye pressure, and their adherence and compliance must be checked periodically. All of this was interrupted during the first years of the pandemic. No less of a problem was the fact that the unavailability of ophthalmology services during the pandemic led to the delay in the diagnosis of new glaucoma cases in a certain percentage of patients.

In spite of all objective difficulties, glaucoma team of the Clinic for Eye Diseases, University Clinical Center of Serbia, prioritized interventions and surgery on patients with elevated IOP uncontrolled by maximal medical therapy and fast progressing glaucoma, so the priority

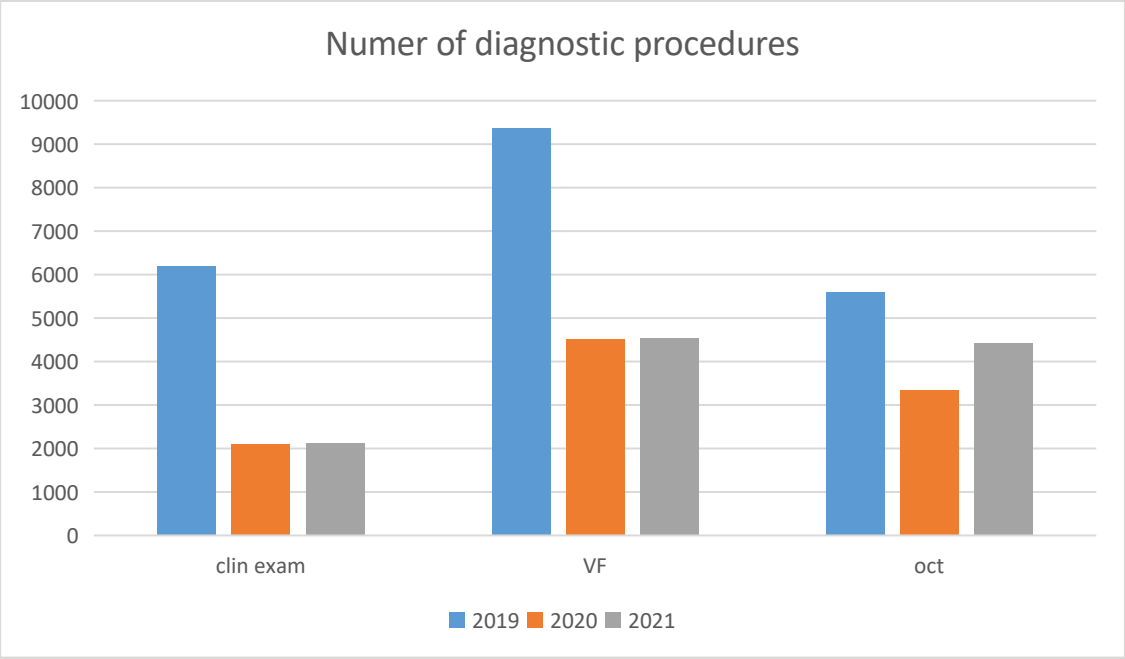

Figure 1. Number of diagnostic procedures (VF-visual field, OCT – optical coherence tomography)

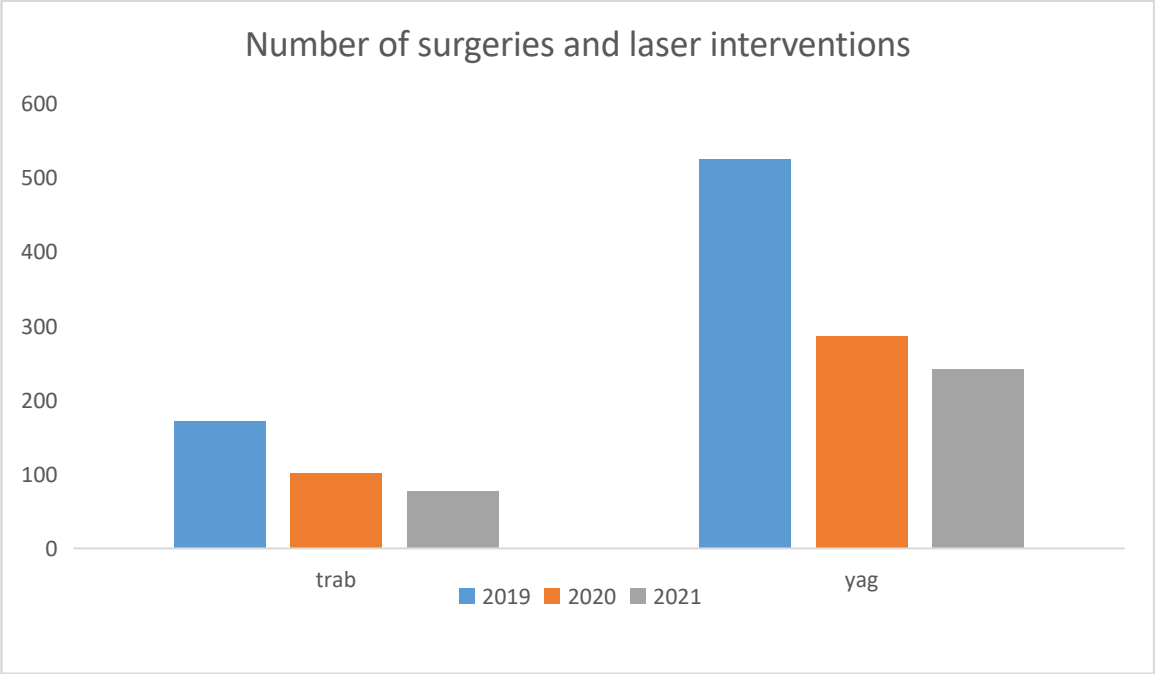

Figure 2. Number of surgeries and laser interventions (trab – trabeculectomy, yag – Nd:Yagiridotomy)

criteria changed according to the circumstances. Unfortunately, as expected, overall, the number of diagnostic procedures, along with interventions (Nd: Yag laser iridotomies) and glaucoma surgeries, dropped excessively, from 20% to over 50%. All patients who underwent glaucoma surgery were monitored after the operation according to the generally accepted protocol, during 3 postoperative months. None of them showed symptoms of the COVID-19 infection in early postoperative period.

The results of our study are only an introduction into the analysis of the severity of the COVID-19 pandemic, i.e. only a part of the insight into the consequences that the pandemic and the reduction of health care had on general population, considering that glaucoma is a disease that must be diagnosed early and treated adequately, so as to avoid possible drastic and irreversible aftermath on the patient's vision and quality of life. Patients, on the other hand, were in dilemma whether to miss their regular follow-up visit because of the possibility of contracting SARS-CoV-2 during in-person visits (9, 10). Regardless of this pandemic, it is well known that ophthalmologists and their patients are at heightened risk for contracting many respiratory diseases from each other. At the Clinic for Eye Diseases, from the moment the pandemic was declared until today, all instructions related to the protection of staff and patients have been conscientiously followed (11).

Our data are different from those reported by a tertiary-level Italian center (12), which reported a slight increase in the number of glaucoma surgeries performed during the first month of the pandemic, but other relevant studies show similar results to ours (3,9,13).

It will probably take us many years to be able to analyze the problem of the COVID-19 pandemic realistically and in detail, but that is precisely why it is worth noting the data we gained during our analysis.

A relative limitation of this study can be the fact that it is retrospective and monocentric, since we analyzed only the data from one clinical center, the Clinic for Eye Diseases, University Clinical Center of Serbia. We must emphasize that this is the referent facility for glaucoma diagnostics and treatment in the Republic of Serbia, and the leading one in the number of glaucoma diagnostic procedures, interventions and operations, and that it covers the entire territory of the Republic of Serbia. 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.

In addition, this is an excellent opportunity to highlight the need for and importance of introducing telemedicine in ophthalmology (14, 15). The combination of online and face-to-face ophthalmology care in which patients have the primary consultation online, and only those requiring further assessment or surgical procedures come to hospital for in-person management seems to be most appropriate to use in cases of any pandemic (16, 17).

CONCLUSIONS

COVID 19 pandemic has caused tectonic disturbances in the provision of diagnostics and treatment for glaucoma patients in Serbia, since during the first two years of the pandemic, almost every other person suffering from glaucoma could not get to their ophthalmologist. Despite the undoubted damage that the pandemic has brought to all

of us, the benefit that can be derived from this situation is a lesson for future similar scenarios in order to practice effective, safe and conscientious ophthalmology.

Conflict of interest:

None to declare.

Author Contributions:

MB conceived and wrote the paper, IM revised it for important intellectual content, LR and TK conducted the search and collected data, VM and JV reviewed other studies in this field, extracted and analyzed data. All authors approved the final version of the manuscript before submission

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UTICAJ PANDEMIJE KOVIDA 19 NA DIJAGNOSTIKU I LEČENJE ODRASLIH OSOBA OBOLELIH OD GLAUKOMA U SRBIJI

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Sažetak

Cilj rada. Cilj ovog rada je da se sumira kontinuitet dijagnostičkih procedura i hirurškog lečenja pacijenata obolelih od glaukoma tokom prve dve godine pandemije kovida 19 u tercijarnom oftalmološkom centru Republike Srbije – Klinici za očne bolesti Univerzitetskog kliničkog centra Srbije, kao i da se broj obavljenih dijagnostičkih procedura, kliničkih pregleda i operacija uporedi sa periodom pre proglašenja pandemije.

Metode. U ovoj retrospektivnoj studiji prikupili smo podatke iz protokola obavljenih dijagnostičkih procedura – kompjuterizovanog vidnog polja, optike koherentne tomografije i kliničkih pregleda, kao i protokola iz operacione sale.

Rezultati. Broj pregledanih pacijenata, broj urađenih dijagnostičkih procedura vezanih za glaukom, kao i broj laserskih intervencija (Nd:Yagiridotomija) i operacija glaukoma (trabekulektomija) opao je od 20% do 66% tokom prve dve godine pandemije kovida 19.

Zaključak. Pandemija kovida 19 dovela je do drastičnog smanjenja broja pregleda, laserskih intervencija i operacija osoba obolelih od glaukoma.

Ključne reči: kovid 19, pandemija, glaukom

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