


# Evaluation of Urgent Retinal Practice and Safety Measures for Physicians and Patients During COVID-19 Pandemic

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**Purpose:** To assess the impact of the COVID-19 pandemic on urgent retina practice and factors influencing adherence of physicians and patients to safety measures.

**Methods:** In this clinical audit, urgent or emergent vitreoretinal surgical disorders that presented to our hospital during the period of 15th March–15th May 2020 were compared with the period just before the pandemic declaration (15th December 2019–15th February 2020). Additionally, two questionnaires assessing the adherence to safety measures were circulated to the medical personnel and a sample of patients. The collected data were analyzed, and accordingly, recommendations were proposed to the hospital administration and specific corrective measures were applied. The outcome of applying these corrective measures was assessed in the re-audit cycle during the period of 15th June–15th August 2020.

**Results:** There was a significant decrease in the number of urgent or emergent vitreoretinal surgical disorders that presented to our hospital during the pandemic (161 versus 302 cases in a similar period before the pandemic;  $p = 0.022$ ). Just with the pandemic recession, there was a significant increase in the number of urgent cases (391 versus 161 cases during the pandemic;  $p = 0.006$ ), also there was an increased number of complex cases. Residents and fellows were less compliant than attending physicians in adherence to safety measures.

**Conclusion:** Delayed presentation of urgent retinal cases during the pandemic highlights the importance of public awareness of urgent conditions that need immediate medical or surgical care. Attention to young physicians during the pandemic is crucial as they are less adherent to safety measures due to work overload.

**Keywords:** COVID-19, retina practice, audit

## Introduction

The newly discovered coronavirus disease (COVID-19) was claimed, for the first time at the end of 2019, in Wuhan – China, and rapidly became a global pandemic.<sup>1</sup> On March 11, 2020, the World Health Organization (WHO) confirmed the COVID-19 as a pandemic outbreak.<sup>2</sup>

The Egyptian government promptly responded to this pandemic in order to fight the virus and limit its spread. Cities and governorates were partially locked down, non-essential businesses were closed, all teaching and academic activities of schools and universities became online, scientific meetings have been canceled and became online through webinars. Outpatient clinics have been limited to the essential service and elective procedures have been postponed. Public health authorities urged the public to stay at home and seek medical care only for urgent conditions. Physicians were using telemedicine tools to communicate with their patients as much as possible.<sup>3</sup>

Until now, there are no proven measures to treat the novel COVID-19 disease. Infected persons can develop severe respiratory distress and multi-organ failure resulting in death. The clinical course might become stormy in case of depressed immune status and advanced age.<sup>4,5</sup> In addition, multiple ocular manifestations have been reported with COVID-19.<sup>6–8</sup>

Most ophthalmological examinations require close contact with the patient's eye, thus increasing the risk of infection to the physicians and patients, especially with the shortage of personal protective equipment such as masks, gloves, and gowns.<sup>9,10</sup> During the pandemic, retina practice constituted a challenging situation as it included a wide variety of medical and surgical disorders that might lead to visual loss if not promptly and adequately treated such as retinal detachment, retinal vascular occlusion, and choroidal neovascularization.<sup>11,12</sup>

Previous studies have reported a reduction of the retinal photoreceptor layer by about 10% of normal width and significant ganglion cell layer changes within a week after retinal detachment.<sup>13,14</sup> Moreover, the postoperative final corrected visual acuity significantly correlates with the duration of macular detachment.<sup>15</sup>

The primary objective of our study was to identify the impact of the COVID-19 pandemic on the number of urgent or emergent vitreoretinal surgical disorders presented to a tertiary ophthalmic center, and the secondary objective was to evaluate adherence of the medical staff and patients to safety measures and factors affecting it.

## Patients and Methods

This was a clinical audit performed at Tanta University Hospitals during the period of 15th March–15th May, 2020. Re-audit was conducted during the period of 15th June–15th August, 2020. The audit and re-audit were approved by the Institutional Review Board and adhered to the tenets of Helsinki's declaration. Written informed consent was obtained from all the subjects before enrollment in the study.

## Audit Rationale

Implementation of COVID-19 pandemic on urgent retina practice was assessed by evaluating the number and types of urgent or emergent vitreoretinal surgical disorders, as determined by the American Academy of Ophthalmology,<sup>16</sup> that presented to the retina service in our hospital during the period of 15th March–15th May, 2020 and compared to the period of 15th December, 2019–15th February, 2020, just before declaration of the pandemic and before any restrictions were applied nationally. Cases that were evaluated included retinal detachment with proliferative vitreoretinopathy (PVR) less than grade B, retinal detachment with PVR more than grade B, tractional retinal detachment threatening or involving the fovea, intraocular foreign body, endophthalmitis, and retinal detachment following globe injuries.

Secondly, a questionnaire assessing the adherence to safety measures during the COVID-19 pandemic and its consequences on the retina practice was circulated to the professors, attending physicians, fellows, residents, and the assisting paramedical staff in the hospital. The questionnaire evaluated adherence to wearing masks and gloves and frequency of changing the mask, hand hygiene after the examination and duration of hand washing, asking patients about Covid-19 symptoms before the examination, implementing social distancing to patients and colleagues, what the physician will do if he feels that the patient is infected with Covid-19 and how much he describes his fear to be infected, and lastly, duration of the examination.

A second questionnaire was distributed to a sample of patients in our hospital that evaluated adherence to wearing masks and gloves, hand hygiene and duration of hand washing, implementing social distancing to doctors and colleagues, what the patient will do if he feels that the doctor is infected with Covid-19 and how much he describes his fear to be infected, and lastly, duration of examination. Additionally, we calculated the average duration of the examination during and before the pandemic by dividing the total number of cases by the duration spent by the physician in the clinic.

The collected data were analyzed, and accordingly, recommendations were proposed to the hospital administration and the following corrective measures were applied:

1. In collaboration with the media department of our university, public awareness-raising was achieved by instructions distributed through social media platforms. Patients were encouraged to contact our emergency department if they cannot determine whether their complaint necessitates seeking urgent medical care or not.
2. Instruction panels of safety measures were placed in every examination room to remind and encourage residents and fellows to adhere to safety measures.
3. An online meeting was scheduled with residents, fellows, nurses, and technicians to inform them about all safety measures, especially when dealing with COVID-19 positive patients in the operating room.

4. Front desk employees and nurses were encouraged to spend more time with each patient to instruct them about the safety measures.

The outcomes of applying the corrective measures were assessed in the re-audit during the period of 15th June–15th August, 2020. Also, the number and types of urgent or emergent vitreoretinal surgical disorders conditions that presented to our hospital were assessed in the re-audit.

## Statistics

Statistical analyses were performed using SPSS Statistics version 20 (IBM, Armonk, NY). The Chi-square test was used to compare the percentages and the *t*-test to compare the means. A *P* value <0.05 was considered to be statistically significant.

## Results of the Primary Audit

During the period between 15th March–15th May, 2020, the number of patients presented to the hospital with urgent or emergent vitreoretinal surgical disorders significantly declined compared to a similar period just before the pandemic (15th December, 2019–15th February, 2020). The number of retinal detachment cases with PVR < grade B and PVR > grade B that presented during the pandemic was 71 versus 122 and 15 versus 29 before the pandemic; *P* < 0.001 and 0.035, respectively. The number of tractional retinal detachment cases during the pandemic was 45 versus 84 before the pandemic; *P* = 0.001. The number of intraocular foreign body cases was 11 during the pandemic compared to 23 before the pandemic; *P* = 0.04. The number of endophthalmitis cases was 7 during the pandemic, compared to 17 before the pandemic; *P* = 0.04. The number of retinal detachment cases following globe injuries was 12 during the pandemic compared to 27 before the pandemic; *P* = 0.016 (Table 1).

The Questionnaire for physicians was answered by 6 professors (15.38%), 12 residents (30.77%), 9 fellows (23.08%), and 12 attending physicians (30.77%).

The results of the Questionnaire showed good adherence to safety measures by all doctors. However, residents and fellows were less compliant with safety measures than professors and attending physicians (Table 2).

The Questionnaire for patients was answered by 200 patients. Patients were less adherent to the safety measures than doctors (Table 3).

One of the notable findings in our audit is the direct impact of safety measures on the patient–doctor relationship, both were anxious about getting infected, so instead of previous warm relations, the situation dropped to a tense formal

**Table 1** Number of Urgent Retina Cases Presented During Pandemic and Similar Periods Just Before and After the Pandemic

	Urgent Retina Conditions Presented to Our Hospital	Similar Period Just Before the Pandemic (15th December, 2019–15th February, 2020)	Period of the Pandemic (15th March–15th May, 2020)	Similar Period After the Start of Pandemic Recession (15th June–15th August 2020)	P value (Before and During the Pandemic)	P value (During and After the Pandemic)
Number of cases	RD with PVR < grade B	122	71	149	< 0.001	< 0.001
	RD with PVR > grade B	29	15	54	0.035	< 0.001
	TRD threatening or involving the fovea	84	45	109	0.001	< 0.001
	IOFB	23	11	27	0.04	0.009
	Endophthalmitis	17	7	18	0.04	0.028
	RD following globe injuries	27	12	34	0.016	0.001

**Abbreviations:** RD, retinal detachment; PVR, proliferative vitreoretinopathy; TRD, tractional retinal detachment; IOFB, intraocular foreign body.

**Table 2** Questionnaire of Effect of Covid-19 Pandemic on the Retina Practice That Was Circulated to the Physicians

		Resident and Fellows	Attending Physicians and Professors
Gender	Male	54.84%	81.82%
	Female	45.16%	18.18%
Mean age $\pm$ standard deviation (years)		28 $\pm$ 2.13 years	52 $\pm$ 4.28 years
Wearing masks	Always	80.65%	95.45%
	Most of the time	19.35%	4.55%
	Rare	0%	0%
Hand hygiene	Always	100%	100%
	Most of the time	0%	0%
	Rare	0%	0%
Wearing gloves	Always	87.09%	90.9%
	Most of the time	12.91%	9.1%
	Rare	0%	0%
The period of hand washing	60 sec	96.77%	95.45%
	30 sec	3.23%	4.55%
	10 sec	0%	0%
How much you describe your fear to be infected?	Severe	90.32%	100%
	Moderate	9.68%	0%
	No fear at all	0%	0%
Implementing social distancing to patients and colleagues	Both of them	100%	100%
	Only patients	0%	0%
	Only doctors	0%	0%
If you feel that patient is infected	I will complete my clinical examination	100%	100%
	I will refuse to do clinical examination	0%	0%
	I will refer	0%	0%
How frequently you change your mask?	Once in the shift	100%	100%
	For every patient	0%	0%
	I do not use	0%	0%
Asking patients about COVID-19 symptoms before examination	Always	80.65%	95.45%
	Most of the time	18.35%	4.55%
	Rare	0%	0%

(Continued)

**Table 2** (Continued).

		<b>Resident and Fellows</b>	<b>Attending Physicians and Professors</b>
Do you give your patients the same time during examination as before?	Yes	0%	0%
	Little shorter time	74.19%	27.27%
	Huge difference	25.81%	72.73%

meeting. Moreover, there was a significant decrease in the time of meeting with the patient, pre-pandemic appointment average time was 12 minutes, in comparison with 8 minutes during the pandemic;  $P = 0.02$ .

## Re-Audit

As the pandemic started to decline, between 15th June and 15th August, 2020, there was a significant increase in the number of urgent cases compared to the pandemic period. Conditions that demonstrated significant increase included retinal detachment (RD) with proliferative vitreoretinopathy (PVR) less than grade B, RD with PVR more than grade B, tractional retinal detachment threatening or involving the fovea, intraocular foreign body, RD following globe injuries, and endophthalmitis.

A simple questionnaire was given to the sub-group of patients with PVR greater than grade B to investigate the cause of delay in seeking medical care. In 37 (68.52%) patients, the cause of delay was the fear of getting infected with COVID-19 from the hospital environment. Five (9.26%) patients were critically ill so, they recognized their decreased vision only after improvement of their general condition. Fifteen (27.78%) patients did not seek medical advice because of reluctance or negligence about the seriousness of their vision problem.

Another Questionnaire was circulated to doctors and patients including a new question “If your compliance to safety measures increased, what was the main reason?”. All residents and fellows showed better compliance with all measures. Twelve (70.59%) residents and fellows stated that shorter shifts allowed them to better adhere to safety measures. However, 5 (29.41%) residents and fellows were encouraged to apply strict safety measures as the increasing number of infections, both globally and locally, eliminated their reluctant attitude.

Patients also showed better adherence to safety measures. One hundred and forty-six (73%) patients confirmed that instructions given by front disc employees and nurses encouraged them to follow safety measures during their presence in the hospital. Twenty-nine (14.5%) patients stated that this was due to awareness by instructions on social media platforms, while in 25 (12.5%) patients, the cause was instruction panels in the waiting area.

## Discussion

In this audit, there was a significant decrease in the number of urgent or emergent vitreoretinal surgical disorders presented to our tertiary center, which receives patients from 4 governorates with a population of more than 5 million, during the COVID-19 pandemic. The main reason for that decline was the reluctance of patients to seek medical help due to the fear of contracting COVID-19. In the United States, the Center for Disease Control (CDC) reported a 42% reduction in the emergency department (ED) visits during the period of March 29th–April 25th, 2020.<sup>17</sup> Similarly, the Canadian Institute for Health Information (CIHI) reported a decline in the ED visits by 25% in March 2020 compared to March 2019.<sup>18</sup>

Our findings are in line with previous studies from North America and the UK that reported a significant reduction in retinal detachment cases presented over a 3- to 5-month duration from the start of the pandemic.<sup>19–22</sup> In addition, Toro et al reported a significant contraction of the main ophthalmic surgeries during the first month of local lockdown in 10 European countries, and vitrectomy surgeries declined by an average 76% compared to the same period in 2019.<sup>23</sup> There was a similar report of reduction of eye surgical procedures in Italy and Poland because of the pandemic.<sup>24–26</sup> Poor functional and anatomical outcomes after retinal detachment surgery are common with delayed surgical intervention as

**Table 3** Questionnaire of Effect of Covid-19 Pandemic on the Retina Practice That Was Circulated to a Sample of Patients

Gender	Male	62%
	Female	38%
Mean age $\pm$ standard deviation (years)		48 $\pm$ 13 years
Wearing masks	Always	41.5%
	Most of the time	26.85%
	Rare	31.65%
Hand hygiene	Always	34.5%
	Most of the time	44.57%
	Rare	20.93%
Wearing gloves	Always	9.14%
	Most of the time	18.36%
	Rare	72.5%
The period of hand washing	60 sec	0%
	30 sec	4.5%
	10 sec	95.5%
How much you describe your fear to be infected?	Severe	17.5%
	Moderate	62%
	No fear at all	20.5%
Implement social distancing to other patients and doctors	Both of them	100%
	Only patients	0%
	Only doctors	0%
If you feel that your doctor is infected	I let the doctor complete my clinical examination	34.5%
	I will refuse the clinical examination	65.5%
Do you feel that your doctor gives you the same time during examination as before?	Yes	0%
	Little shorter time	74.5%
	Huge difference	25.5%

a result of persistent vision loss for more than 6 days, increased incidence of macular detachment, and increased extent of retinal detachment.<sup>23,27,28</sup>

Consequently, the period after the start of pandemic recession witnessed a significant increase in the number of urgent cases and increased number of complex cases, such as RD with significant PVR, advanced tractional retinal detachment, intraocular foreign body, and RD following globe injuries.

On the other hand, Arjmand et al reported a significant increase in the number of retinal detachments presented to a Canadian retina center during the pandemic. The authors attributed this increase to the closure of other ophthalmic

clinics in the city. However, the Egyptian health care system has a large sector of private practice that continued to receive urgent cases during the pandemic.<sup>29</sup>

Our findings elaborate on the importance of preparing tertiary medical centers to be able to handle work overload after periods of pandemics. As this sudden overload occurred, while the pandemic was still recessing, we ensured that surgical care was offered to the patients without delay but without jeopardizing the strict safety measures. This was achieved by increasing the working hours per day in the outpatient clinic and the operating room and working on the weekends, as necessary, to avoid over-crowdedness.

Although all doctors demonstrated good adherence to safety measures, residents were less compliant than fellows and attending physicians. We tried to improve their compliance by decreasing the workload by shortening the duration of the shifts. The majority of residents contributed their improved compliance to the reduced workload. Consequently, we recommend reducing tasks and working hours of residents to improve their adherence to safety measures as they are at higher risk of infection due to long working hours and greater contact with patients. Additionally, studies have reported a negative impact of COVID-19 pandemic on the mental health of physicians with subsequent impact on the residency training program. Therefore, virtual training and surgical simulators should be included in the training programs in addition to traditional training methods.<sup>30</sup>

The majority of patients affirmed the vital role of front disc employees and nurses in raising their awareness of necessary safety measures. This demonstrates the substantial role of paramedical personnel during the pandemic.

Ferrara et al demonstrated the impact of the pandemic on the medical and surgical training of residents and fellows. Reduction of more than 75% of surgical practice was reported by 74.6% of trainees, and half of them stopped surgeries completely. Alternative methods of training such as simulator training and web-based teaching could play an important role in optimizing the ophthalmology training during the pandemic. This is especially important for retinal fellows due to the long learning curve of vitreoretinal surgery.<sup>31</sup>

The COVID-19 pandemic raised the ethical issue of prioritizing patients to receive treatment depending on the urgency of the condition and potential adverse outcomes due to delayed treatment.<sup>23,32,33</sup> Diseases associated with a high risk of morbidity and mortality due to treatment delay should be prioritized over those with lower risk.<sup>34,35</sup>

Our study has several limitations, which should be considered when assessing our results. First, the study was conducted at a single tertiary center and needs to be repeated at a national scale in order to be representative of the wide Egyptian health care system. Second, the study might have biases related to health-seeking behavior, economic status of patients, and local epidemiological situation of COVID-19 transmission.

In conclusion, there was a significant decline in the number of urgent retina cases during the pandemic due to patients' fear of leaving home, which resulted in a significant increase of urgent and complex cases after the pandemic started to decline. Public awareness raised about urgent conditions requiring immediate intervention is crucial, and the medical system should be ready to manage a higher number of urgent and complicated cases after the pandemic. During the pandemic, resident physicians were less compliant with safety measures due to work overload. It is important to give extra attention to young doctors during pandemics as they are more vulnerable to infection due to greater contact with patients.

## Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis, and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agreed to be accountable for all aspects of the work.

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## Disclosure

The authors report no conflicts of interest in this work.

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