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Prioritising of Retinal Diseases During Covid-19 Outbreak

İnci Elif Erbahçeci Timur[1], **Nagihan Uğurlu**[1]

1 Ankara City Hospital, Department of Ophthalmology, Ankara, Turkey

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Abstract

Purpose: The aim of this study was to determine a management strategy for patients with retinal diseases to minimise the potential risk of visual impairment due to the postponement of treatments and visits during the lockdown for COVID-19.

Methods: Records of all patients who had rescheduled for retina appointments from March 20, 2020, to June 1, 2020, were identified to evaluate the details regarding best-corrected visual acuity (BCVA) before the COVID-19 pandemic (V_0 visit) and at the first visit after lockdown (V_1 visit); primary diagnosis, duration of postponement (weeks), change in Snellen line and intravitreal injection (IVI) requirement were recorded. Patients were rescheduled according to our diagnosis-based triage practice pattern; emergency, Group 1; urgent, Group 2; routine, Group 3; and elective, Group 4. BCVA, loss of Snellen line, IVI requirement, and duration of postponement were compared between V0 and V1 visits. In addition, BCVA, change in Snellen line, and the relationship between loss in Snellen line and duration of postponement was evaluated in intravitreally injected patients with neovascular age-related macular degeneration (nAMD) and diabetic macular edema (DME).

Results: A total of 1,383 eyes of 763 patients were recruited in this study. The difference in BCVA at V0 visit was statistically significant among the groups and better in Group 4 ($p<0.000$). BCVA at V_1 visit was worse in group 1 and statistically different between groups ($p<0.001$). BCVA was also worse at V_1 visit than V_0 visit in groups 1 and 2 ($p<0.001$ and $p=0.003$). Patients with nAMD had more loss in Snellen line than patients with DME in Group 1 who were injected intravitreally ($p=0.004$).

Conclusion: These results can support retina specialists in anticipating the possible clinical consequences of outbreaks on retina patients and developing successful management strategies.

Keywords: COVID-19; coronavirus outbreak; prioritising, retinal diseases

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Correspondence / Yazışma Adresi: *İnci Elif Erbahçeci Timur, Ankara City Hospital, Department of Ophthalmology, 06800, Ankara, Turkey, e-mail: incieliftimur@gmail.com*

Covid-19 Salgın Sürecinde Retina Hastalıklarının Önceliklendirilmesi

Öz

Amaç: Çalışmanın amacı COVID-19 karantinası sırasında retina hastalığı olanlarda tedavi ve muayene ziyaretlerinin ertelenmesi nedeniyle potansiyel görme bozukluğu riskinin en aza indirecek bir yönetim stratejisi belirlemektir.

Yöntemler: 20 Mart 2020 - 1 Haziran 2020 tarihleri arasında retina takipleri yeniden planlanan hastalar belirlenerek COVID-19 pandemisi öncesi (M_0 muayene) ve pandemi sırasındaki ilk muayene (M_1 muayene) en iyi düzeltilmiş görme keskinlikleri (EİDGK), primer tanıları, ertelenme süresi (hafta), Snellen sıra değişiklikleri ve intravitreal enjeksiyon gereksinimi hasta kayıtlarından elde edildi. Hastaların takip planları tanıya dayalı triyaj uygulama sistemimize göre Grup 1; acil, Grup 2; zorunlu, Grup 3; rutin ve Grup 4; elektif olarak yeniden belirlendi. M_0 ve M_1 muayenelerdeki EİDGK, Snellen sıra değişiklikleri, intravitreal enjeksiyon gereksinimi ve ertelenme süreleri karşılaştırıldı. İntravitreal enjeksiyon uygulanan neovasküler yaşa bağlı makula dejeneransı (YBMD) olan hastalar ve diyabetik makuler ödemli (DMÖ) hastalardaki EİDGK ve Snellen sıra değişiklikleri; Snellen sıra kaybı ile gecikme süresi arasındaki ilişki değerlendirildi.

Bulgular: Çalışmaya 763 hastanın toplam 1383 gözü dahil edildi. M_0 muayenede EİDGK-gruplar arasında istatistiksel olarak anlamlı farklıydı ve Grup 4'te daha iyiydi ($p<0,000$). M_1 muayenedeki EİDGK Grup 1'de daha kötüydü ve her grup arasında istatistiksel olarak farklılık vardı ($p<0,001$). Ayrıca EİDGK Grup 1 ve Grup 2'de M_1 muayenede M_0 muayeneden daha kötüydü ($p<0,001$ ve $p=0,003$). Grup 1'de intravitreal enjeksiyon yapılanlardan neovasküler YBMD'li hastalarda DMÖ'lü hastalara göre Snellen sıra kaybı daha fazlaydı ($p=0.004$)

Sonuç: Bu sonuçlar retina uzmanlarına salgının retina hastalarındaki olası klinik sonuçları tahmin etme ve başarılı yönetim stratejileri geliştirilmesinde yol gösterici olabilir.

Anahtar kelimeler: COVID-19; koronavirüs salgını; önceliklendirme; retina hastalıkları.

INTRODUCTION

In December 2019, a new strain of the coronavirus family causing severe pneumonia was identified[1]. The disease was named 'Coronavirus Disease 2019 (COVID-19)' by the World Health Organization (WHO) and then elucidated as a Public Health Emergency of International Concern and approved COVID-19 as a pandemic on March 11, 2020[2].

Being 65 years or older, having poorly controlled underlying health problems, and living in care facilities are the widespread risk factors for developing serious symptoms of COVID-19 infection, and these factors are also common among patients with retinal diseases. Many patients with retinal diseases may also have one or more health problems such as chronic lung disease, serious cardiovascular complications, being immunocompromised, diabetes mellitus, hypertension, obesity, chronic liver, and chronic kidney diseases, all of which make them vulnerable to more severe COVID-19 disease[3].

Retinal diseases, including neovascular age-related macular degeneration (nAMD), diabetic macular edema (DME), and macular edema secondary to retinal vein occlusion (RVO), require intravitreal anti-vascular endothelial growth factor (anti-VEGF) or steroid injections in a timely manner. A postponement of care for these patients can serve in permanent visual impairment, and thence, a follow-up algorithm is essential for these patients. Therefore, the retina specialists sought to triage patients and decided that needs urgent care. Eye care professionals must always consider individual medical and social situations apart from financial status such as age of the patient, laterality of the disease, location of the patient, and the availability of medical care during the lockdown.

To characterise the proper reappointment interval and produce guidance on implementing steps to prioritise treatment and grade priority, we sought to identify the demographic features of patients, intravitreal injection (IVI) rate, and visual acuity according to medical records before and during the COVID-19 pandemic. Management of patients with retinal diseases requires determining indispensable medical needs and considering healthcare staff and patients to

decrease the risk of infection spread. The present study aims to determine the management strategy of retinal diseases by our diagnosis-based triage practice pattern and identify the effects of delay in follow-up and intravitreal treatment on the visual status of patients during the COVID-19 pandemic.

METHODS

Yildirim Beyazit University Medical School Ethic Committee of Clinic Trials (Ankara, Turkey) confirmed the study on December 16, 2020, with an approval number of 116. Furthermore, written informed consent was acquired from the subjects in accordance with the Declaration of Helsinki. The present prospective study utilised data from medical records in the retina department of a tertiary referral hospital in Turkey.

After the first COVID-19-positive patient was seen in Turkey in March 2020, health services were interrupted for a while. Continuation of care for patients with retinal diseases, where possible, is essential to avoid irreversible vision impairment. Obscuring delays of appointments without rescheduling within a proper time may result unpredictably. When considering these factors, the necessity of a triage pattern is apparent. Our management strategy for prioritising to grade the disease severity during the outbreak was based on the diagnosis and clinical features. Appointments of patients with retinal diseases between March 20, 2020, and June 1, 2020, were rescheduled, and patients were prioritised as mentioned in Table 1.

Table I: Triage of retinal clinic situations

	Emergency-seeimmediately-Group 1	Urgent-see as soon as possible-Group 2	Routine-reschedule 4-6 months Group 3	Elective-reschedule>6 months-Group 4
New/Follow-up cases	• Suspected or confirmed active nAMD needing treatment • IVI for DME, CRVO, and macular edema. • Active PDR requiring and continuing treatment never lasered and/or with recent vitreous hemorrhage at last visit • IVI controls without loading dose • Treatment-naive PDR patients	• Macular edema requiring treatment • Severe NPDR with/without macular edema • IVI controls with just completed loading dose • nAMD in the first two years of treatment • Late-stage AMD with just vision loss before the outbreak • RVO requiring treatment (laser or IVI)	• Advanced stage non-neovascular (dry) AMD • Stable nAMD (require no treatment) • Moderate NPDR without macular edema • CSCR • Retinal dystrophies • Screening for macular drug toxicity • Stable RVO with macular edema, having had multiple intravitreal injections	• Early-stage non-neovascular (dry) AMD • Mild NPDR • Stable; treated proliferative diabetic retinopathy • Peripheral retinal degeneration

AMD: age-related macular degeneration, CRVO: central retinal vein occlusion, CSCR: central serous chorioretinopathy, IVI: intravitreal injection,nAMD: neovascular age-related macular degeneration, NPDR: non-proliferative diabetic retinopathy, PDR: proliferative diabetic retinopathy, RVO: retinal vein occlusion

Guidance for prioritising patients according to medical history and need

Based on our diagnosis-based triage system, we classified cases as emergency, urgent, routine, and elective (1 to 4). Group 1 is emergency and see the patient immediately; Group 2 is urgent and considers examining the patient as soon as possible; and Group 3 is routine and reschedule appointments within 3-6 months. The cases that can be postponed for more than six months without a prominent risk for visual impairment and functioning are qualified as "elective" and classified as Group 4.

Intravitreal injection control patients without loading dose, suspected or confirmed active nAMD needing treatment, new cases with vision loss or visual field defects, and new central retinal vein occlusion (CRVO) cases were prioritised as Group 1, and their treatment schedules were maintained immediately. In addition, IVI for nAMD, DME, RVO, and macular edema were classified as Group 1 to complete the loading dose

for maximising the reappointment interval as much as possible.

Patients with nAMD in the first two years of treatment who need frequent IVI two years after the diagnosis of nAMD[4,5], late-stage non-neovascular (dry) AMD with vision loss at the last visit before the outbreak of COVID-19, and IVI controls with a recently completed loading dose apart from visual status were prioritised as group 2.

Patients with DME and macular edema secondary to branch retinal vein occlusion (BRVO) are less likely to endure irreversible vision loss in the short term[6,7] nevertheless, extended and delayed treatments (> 4–6 months) should be prevented; the process should be assessed depending on the analysis of subgroups, age, types of diabetes and course of disease progression during the follow-up period. Generally, diabetic retinopathy (DRP) stages were defined as severe nonproliferative diabetic retinopathy (NPDR) in Group 2, moderate NPDR in Group 3, and mild NPDR in Group 4 unless macular edema persists (Table 1).

Proliferative diabetic retinopathy (PDR) patients without–DME, vitreous hemorrhage, panretinal photocoagulation need, and patients with asymptomatic peripheral retinal degeneration and early-stage non-neovascular AMD were classified into Group 4.

Subgroup analysis of DRP was classified as PDR and NPDR; PDR was subgrouped as active or

inactive, and NPDR as mild, moderate, or severe. The subgroup analysis of AMD was described as neovascular and non-neovascular; nAMD as active or stable and non-neovascular as early, intermediate, or late stage.

All prioritised patients were called to inform them about rescheduling and arrange a new appointment. The records of 763 patients examined after the lockdown were recruited in this study. Best corrected visual acuity (BCVA) before the COVID-19 pandemic (V_0 visit) and at the first visit after lockdown (V_1 visit), gender, age, primary diagnosis, duration of postponement (weeks), change in Snellen line, and IVI requirement for each group were evaluated. BCVA, loss of Snellen line, intravitreal injection requirement, and duration of postponement were compared between V_0 and V_1 visits. BCVA and loss of Snellen line were evaluated in intravitreally injected patients with nAMD and DME. The relationship between loss in Snellen line and duration of postponement was determined. The IVI rate and the distribution of diagnosis in each group were also compared.

Statistical Analysis

All analyses and calculations were performed via IBM SPSS Statistics 22.0 (IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.). BCVA at V_0 and V_1 visits were determined using Snellen chart and converted to the logarithm of the minimal angle of resolution (logMAR) for the statistical analyses. Independent samples t-test or Mann-Whitney U test was used to compare quantitative variables among groups. Paired sample t-test was used to determine the differences at V_0 and V_1 visits in each group. Correlations with changes in Snellen line were analysed using Spearman's correlation coefficient. All data were expressed as mean± standard deviation (±SD). A p-value < 0.05 was considered statistically significant in the present study.

RESULTS

A total of 763 patients' appointments were rescheduled. 432 (56.7%) women and 331 (43.3%) men were recruited in this study. BCVA was worse at V_1 visit (p=0.000); mean BCVA was 0.46 ± 0.49 logMAR units at V_0 visit and 0.48 ± 0.51 logMAR units at V_1 visit. 1383 eyes of 763 patients were analysed; 98 (7.1%) eyes had active nAMD, and 102 (7.4%) had active PDR. In addition, 430 (31.1%) had non-neovascular AMD, and 36 (2.6%) had stable nAMD. Of the studied eyes, 347 (25.1%) had NPDR, and 143 (10.3%) had inactive PDR. Furthermore, 592 (42.8%) patients had any form of DRP, and 63 (4.6%) had CRVO or BRVO. The distribution of diagnosis in the study population is summarised in Table 2.

Table II: Distribution of diagnosis in the study population

Diagnosis	n, %
Active nAMD	98 (7.1%)
Non-neovascular AMD	430 (31.1%)
Stabil nAMD	36 (2.6%)
DRP	592 (42.8%)
NPDR	347 (25.1%)
Active PDR	102 (7.4%)
Inactive PDR	143 (10.3%)
CRVO/BRVO	18/45 (4.6%)
Peripheral retinal degeneration	32 (2.3%)
Epiretinal membrane	36 (2.6%)
Others (CSCR, telangiectasia, degenerative myopia, HTRP, retinal dystrophy)	96 (6.9%)
Total	1383 (100%)

AMD: age-related macular degeneration, BRVO: branch retinal vein occlusion, CRVO: central retinal vein occlusion, CSCR: central serous chorioretinopathy, DRP: diabetic retinopathy, HTRP: hypertensive retinopathy, n: number, nAMD: neovascular age-related macular degeneration, NPDR: non-proliferative diabetic retinopathy, PDR: proliferative diabetic retinopathy.

Group 1 consisted of 177 (12.8%) eyes of 94 (12.3%) patients; 211 (15.3%) eyes of 116 (15.2%) patients were in Group 2, 464 (33.6%) eyes of 256 (33.6%) patients were in Group 3 and 531 (38.4%) eyes of 297 (38.9%) patients were in Group 4 (Table 3.). When comparing BCVA at V_1 visit between groups apart from groups 1 and 2, the comparisons were statistically significant and better in Group 4 ($p<0.000$, each comparison; apart from Group 1 vs Group 2 $p=0.081$). BCVA at V_1 visit was worst in Group 1 and statistically different among groups ($p<0.001$, in all comparisons). BCVA was worse at V_1 visit than V_0 visit in groups 1 and 2 ($p=0.000$ and $p=0.003$). No difference was observed in groups 3 and 4 ($p=0.117$ and $p=0.830$).

The majority of patients in Group 1 had active nAMD (n=43, 23.7%) and active PDR (n=44, 23.8%). Group 2 was similar to group 1; active nAMD (n=55, 26.1%) and active PDR (n=58, 26.6%). The majority of patients were taken care of for DRP (n=212, 45.7%) in Group 3 and non-neovascular AMD (n=262, 49.3%) in Group 4 (Table 3).

Table III: Characteristic features of study groups

	Group 1	Group 2	Group 3	Group 4	*p*-value
Number of patients	94 (12.3%)	116 (15.2%)	256 (33.6%)	297 (38.9%)	
Number of eyes	177 (12.8%)	211 (15.3%)	464 (33.6%)	531 (38.4%)	
Age (years)	63.63±7.7	64.61±7.75	58.3±8.6	59.5±9.3	0.000*
BCVA(logMAR)					
V_0	0.76±0.59	0.65±0.55	050±0.48	0.25±0.31	0.000*
V_1	0.9±0.66	0.71±0.54	0.51±0.48	0.25±0.32	0.000*
Active nAMD (n,%)	43 (23.7%)	55 (26.1%)	-	-	
Non-neovascular AMD (n,%)	16 (9%)	28 (13.2%)	124 (26.7%)	262 (49.3%)	
DRP (n,%)	107 (59.9%)	103 (47.9%)	212 (45.7%)	170 (31.9%)	
Active PDR (n,%)	44 (23.8%)	58 (26.6%)	-	-	
Inactive PDR(n,%)	-	-	89 (19%)	54 (10%)	
NPDR (n,%)	63 (36.1%)	45 (21.3%)	123 (26.7%)	116 (21.9%)	
CRVO/BRVO (n,%)	5/3 (4.5%)	4/10 (6.6%)	8/27 (7.5)	1/5 (1.1%)	
Requirement of IVI (n,%)	114(64.4%)	53 (25.1%)	8 (1.7%)	-	
Duration of postponement(weeks)	3.8±1	6.3±1.2	16.4±4.7	29.9±5.7	0.000*

*AMD: age-related macular degeneration, BCVA: best-corrected visual acuity, BRVO: branch retinal vein occlusion, CRVO: central retinal vein occlusion, DRP: diabetic retinopathy, IVI: intravitreal injection, n: number, nAMD: neovascular age-related macular degeneration, NPDR: non-proliferative diabetic retinopathy, PDR: proliferative diabetic retinopathy, V0: last visit before COVID-19 pandemic, V1: first visit after the lockdown.*p<0.001*

In total, 175 eyes in groups 1, 2, and 3 required IVI. There was a significant difference in IVI requirement between groups, with the most being found in Group 1 ($p<0.01$): 114 (64.4%) eyes in Group 1, 53 (25.1%) in Group 2 and 8 (1.7%) in Group 3. The duration of postponement was 3.8±1 weeks in Group 1, 6.3±1.2 weeks in Group 2, 16.4±4.7 weeks in Group 3, and 29.9±5.7 weeks in Group 4 (Table 3).

Of the eyes requiring IVI, 114 (65.1%) were in Group 1, 53 (30.3%) were in Group 2, and 8 (4.6%) were in Group 3. These injections included both loading and PRN (pro re nata) doses. Patients with active PDR and NPDR with macular edema

required more IVI in groups 1 (eyes, n=63; 55.3%) and 2 (eyes, n=26; 49%). BCVA at V_1 visit was significantly worse in Group 1 and Group 2 than BCVA at V_0 visit (p<0.001 and p<0.001), and no difference was found in Group 3 (p=0.588) (Table4).

Table IV: Distribution of intravitreal injection requirement by diagnosis

	Group 1	Group 2	Group 3
Number,n (%)	114 (65.1%)	53 (30.3%)	8 (4.6%)
Active nAMD (n,%)	41 (36%)	23 (43.4%)	
DME	63 (55.3%)	26 (49%)	3 (37.5%)
Active PDR (n,%)	22 (19.3%)	13(24.5%)	
NPDR (n,%)	41 (36%)	13 (24.5%)	3 (37.5%)
RVO (n,%)	8 (6.6%)	4 (7.6%)	5 (62.5%)
Other (n,%)	2(2.1%)		
BCVA (logMAR)			
V_0	0.81±0.49	0.63±0.41	0.67±0.65
V_1	1.02±0.59	0.82±0.45	0.76±0.59
p-value	0.000*	0.000*	0.588

*BCVA: best-corrected visual acuity, DME: diabetic macular edema, nAMD: neovascular age-related macular degeneration, NPDR: non-proliferative diabetic retinopathy, PDR: proliferative diabetic retinopathy, RVO: retinal vein occlusion, V0: last visit before COVID-19 pandemic, V1: first visit after the lockdown.*p<0.001*

Intravitreally injected patients were also compared in groups 1 and 2 according to the diagnosis of retinal diseases such as nAMD and DME. BCVA at V_0 and V_1 visits were worse, and loss in Snellen line was more in patients with nAMD than in patients with DME in Group 1 (p=0.031, p<0.001, and p=0.004). Patients with nAMD were also older than patients with DME in groups 1 and 2 (p<0.001 and p<0.001). However, the duration of postponement was not different between patients with nAMD or DME in groups 1 and 2 (p=0.623 and p=0.984) (Table 5). A longer duration of postponement and the priority of group had moderate correlation with more loss in Snellen line (p<0.001, Spearman correlation: 0.422 and CI:0.367-0.477, p<0.001, Spearman correlation: 0.415, CI:0.359-0.469 and p<0.001).

Table V: Comparison of intravitreally injected patients with nAMD and DME in groups 1 and 2.

	Group 1			Group 2		
	nAMD (n=41)	DME (n=63)	*p*value	nAMD (n=23)	DME (n=26)	*p*value
Age (years)	69.3±4.5	61±7.2	0.000**	69.8±5.2	60.3±5.4	0.000**
BCVA (logMAR)						
V_0	0.97±0.56	0.74±0.41	0.031*	0.68±0.45	0.63±0.39	0.944
V_1	1.3±0.65	0.85±0.45	0.000**	0.94±0.44	0.94±0.44	0.242
Change in Snellenline	-0.094±0.097	-0.045±0.055	0.004*	-0.078±0.079	-0.135±0.103	0.057
Duration of postponement(weeks)	3.95±1.02	3.84±1.13	0.623	6.65±1.43	6.77±1.17	0.984

*BCVA: best corrected visual acuity, DME: diabetic macular edema, nAMD: neovascular age-related macular degeneration, V_0: last visit before COVID-19 pandemic, V_1: first visit after the lockdown. *p<0.05 **p<0.001*

DISCUSSION

The COVID-19 outbreak has resulted in unpreventable number of infections and deaths in recent times and continues to damage the healthcare systems. Meanwhile, we can provide the appropriate care by constituting a safety practice pattern and prioritising patients vulnerable to COVID-19. In addition, several organisations, including the American Society of Retina Specialists, Canadian Ophthalmological Society, and Japanese Ophthalmological Society, have declared general guidance for ophthalmologists to administer care to patients during the COVID-19 pandemic[8-14]. However, these guidances are specifically appropriate to the country's healthcare system, and their applicability to other countries is based on country-specific factors.

In the present study, we have developed a triage pattern for managing patients with retinal

diseases during the COVID-19 lockdown and outbreak in Turkey. As significant as visual impairment may be to patients, we always consider that non-ophthalmic life-threatening conditions must replace ophthalmological considerations with this diagnosis-based triage practice pattern. The safety of patients and healthcare staff is critical in all steps.

A decline in the number of appointments can decrease the risk of exposure to COVID-19, though an extended period of not visiting the ophthalmologist may result in irreversible visual impairment. Thus, patients with retinal disorders can be triaged effectively and efficiently using this triage pattern without facilitating disease transmission. Postponed appointments were rescheduled by determining each patient's diagnosis, prognosis, and medical history. After prioritising, all patients in each group were called to inform them about the rescheduling date; therefore, appointment delay was favorably controlled.

Government restrictions on the movement of >65 years older elderly persons in Turkey to decrease any potential exposure to the virus, and the stack of arranged appointments may necessitate prioritising the appointments for the elderly population essential. When considering the vulnerability of elderly patients, the accuracy of triage systems has been receiving attention. Going through patients' medical records may be time-consuming, but it constitutes the basis of the triage system.

Retinal diseases, including PDR, DME, and nAMD, that can result in permanent visual impairment if not treated in a proper time manner constituted the majority of patients requiring IVI in priority groups 1 and 2 of the study. Therefore, these patients generally cannot have their visits delayed for an extended period. On the other hand, retina specialists had difficulty determining which patients requiring intravitreal treatment were the most likely to endure a prolongation of their regular follow-up interval to reduce patient, medical staff, and physician exposure and decrease the spread of COVID-19. The requirement of IVI, diagnosis distribution, and visual acuity varied between priority groups in this study. 64 of 98 patients with active nAMD required intravitreal treatment, and 35 of 102 patients with active PDR required intravitreal treatment. There was more Snellen line loss in patients with nAMD than in patients with DME. Snellen line loss had a moderate positive correlation with the duration of postponement. The worst visual acuity, the least number of patients, and the most amount of IVI were in Group 1. Viola et al[15] determined lower adherence to IVI treatment rate during lockdown weeks compared to unlocked weeks and the previous trimester. In the current study, loss in Snellen line was more, and BCVA at V_0 and V_1 visits were worse in patients with nAMD than in patients with DME intravitreally injected in Group 1. Defining the bounds of groups and examining the prioritised groups as soon as possible may minimise the unpredictable outcomes of COVID-19 on patients with retinal diseases and in retina departments. Thus, the goal of our practice pattern is to optimise the advantages for patients. Individual patient factors may need to be considered when determining whether to bring a patient in or when defining the period between visits.

Intravitreal injections are mandatory visits, and a longer duration of postponement may increase the risk of potential vision loss for patients with nAMD rather than patients with DME. However, while planning to reduce the risk of vision loss and avoid exposure to viral loads, priority patients should be identified with a diagnosis-based triage practice pattern. Increased loss in Snellen line was associated with a longer duration of postponement in the high-risk group. This relation may be because of

the short-term effect of the COVID-19 pandemic on patients with retinal diseases.

In retina departments, retina specialists are on the frontline, which means a high risk of exposure to COVID-19 because they examine patients at a very close distance. Thus, the psychological stress caused by COVID-19 on healthcare providers is unavoidable, a fact that has been well described[16,17]. Prioritising patients according to this triage pattern would avoid not only the burden on healthcare profesionals but also support their well-being.

To the best of our knowledge, no studies have been published on the distribution of diagnosis in rescheduled patients, characteristic features, and differences in prioritised groups in a retina department. Our triage scheme also has some limitations. In this study, the available data of a single centre were limited to short-term, had records of two different time periods, and lacked long-term results. Furthermore, this study did not include the evaluation of those outcomes that should have been done after the end of the pandemic was absent. Therefore, we could not compare our preliminary results with any in the literature.

We hope this diagnosis-based triage practice pattern should become the preferred practice of retina specialists, where applicable. Indeed, the applicability of this practice pattern will be based on the actual status of the pandemic in each individual country; however, the general principles should be appropriate worldwide.

CONCLUSION

The probability of exposure to COVID-19 can be reduced by postponing scheduled appointments. Triage based on the severity of retinal diseases and COVID-19 status, appropriate and acceptable personal protective equipment, social distancing, sanitisation, and other mandatory precautions should help retina specialists perform their professional responsibilities in a safe manner. Using preferred triage practice patterns will facilitate overcoming safer patient encounters without detriments to the patients and healthcare staff. In conclusion, these preliminary results can help retina specialists anticipate the possible consequences of outbreaks on retina patients and develop successful management strategies. These results also emphasise prioritising the retinal diseases is mandatory for avoiding persistent visual impairments.

This study was declared as a presentation at the Spring Symposium of the Turkish Ophthalmological Association, 2021

Ethics Committee Approval: Yildirim Beyazit University Medical School Ethic Committee of Clinic Trials (Ankara, Turkey) confirmed the study on December 16, 2020, with an approval number of 116. Furthermore, written informed consent was acquired from the subjects in accordance with the Declaration of Helsinki.

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REFERENCES

1. Guan W-J, Ni Z-Y, Hu Y. Clinical Characteristics of Coronavirus Disease 2019 in China. N Engl J Med. 2020:1–13.

2. Cucinotta D, Vanelli M. WHO Declares COVID-19 a Pandemic. Acta Biomed. 2020;91(1):157–160.

3. Jee Y. WHO International Health Regulations Emergency Committee for the COVID-19 outbreak. Epidemiol Health. 2020;42:e2020013. doi: 10.4178/epih.e2020013.

4. Bakri SJ, Thorne JE, Ho AC et al. Safety and Efficacy of Anti-Vascular Endothelial Growth Factor Therapies for Neovascular Age-Related Macular Degeneration: A Report by the American Academy of Ophthalmology. Ophthalmology. 2019;126(1):55-63. doi: 10.1016/j.ophtha.2018.07.028.

5. Freund KB, Korobelnik JF, Devenyi R, et al. Treat-and-extend regimens with anti-VEGF agents in

retinal diseases: a literature review and consensus recommendations. Retina. 2015;35(8):1489-506.

6. Bressler NM, Beaulieu WT, Glassman AR, et al. Persistent macular thickening following intravitreousaflibercept, bevacizumab, or ranibizumab for central-involved diabetic macular edema with vision impairment: a secondary analysis of a randomized clinical trial. JAMA Ophthalmol. 2018;136:257–69.

7. Schmidt-Erfurth U, Lang GE, Holz FG, et al. RESTORE Extension Study Group (2014) Three year outcomes of individualized ranibizumab treatment in patients with diabetic macular edema: the RESTORE extension study. Ophthalmology. 2014; 121:1045–53.

8. American Academy of Ophthalmology (2020) Important coronavirus updates for ophthalmologists. March 31, 2020 https://www.aao.org/education/headline/alert-important-coronavirus-context

9. Kodjikian L. Quelleconduite à tenir adopter vis à vis des injections intravitréennes (IVT) danscettepérioded'épidémie au Covid-19 – SARS-CoV-2 ? [How to approach intravitreal injections during this COVID-19 pandemic ?]. J Fr Ophtalmol. 2020;43(6):539-540. doi: 10.1016/j.jfo.2020.04.019.

10. Nguyen AX, Gervasio KA, Wu AY. Differences in SARS-CoV-2 recommendations from major ophthalmology societies worldwide. BMJ Open Ophthalmol. 2020;5(1):e000525.

11. Lim LW, Yip LW, Tay HW et al. Sustainable practice of ophthalmology during COVID-19: challenges and solutions. Graefes Arch ClinExpOphthalmol. 2020;258(7):1427-36. doi: 10.1007/s00417-020-04682-z.

12. Hahn P, Blim JF, Packo K, et al. The Impact of COVID-19 on US and International Retina Specialists, Their Practices, and Their Patients. J Vitreoretin Dis. 2021;6(1):40-6. doi: 10.1177/24741264211034112

13. Chaudhary V, Rosenberg D, Barbosa J, et al. National survey of Canadian Retina Society members on guidelines for ophthalmic care during the COVID-19 crisis: Canadian Retina Research Network (CR2N) COVID-19 Steering Committee analysis. Can J Ophthalmol. 2020;55(5):452-4. doi: 10.1016/j.jcjo.2020.06.001.

14. Hu V, Wolvaardt E. Ophthalmology during COVID-19: who to see and when. Community Eye Health. 2020;33(109):20-3.

15. Viola F, Milella P, Giuffrida FP, Ganci S, Invernizzi A. The impact of coronavirus disease (COVID-19) pandemic on intravitreal injections treatment for macular diseases: report from a referral hospital in Milan. Retina. 2021;14(4):701-5.

16. Enli TF, Koyuncu E, Özel Ş. A review of protective and risk factors affecting psychosocial health of healthcare workers in pandemics. Ankara Med J. 2020; 20: 488-504.

17. Yalçın G, Sayınbatur B, Karay E, Karakaş M. Psychological Stress of Healthcare Workers Caused by the COVID-19 Pandemic. Dicle Med J. 2020;47(3):525-41.