Additive Value of a Face-to-Face Visit to Virtual Remote Decision in Patients with Neovascular Age-Related Macular Degeneration

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Keywords

Age-related macular degeneration · Management · Optical coherence tomography · Ophthalmology · Telemedicine · Virtual evaluation

Abstract

Introduction: The increasing high prevalence of neovascular age-related macular degeneration (nvAMD) in the aging population combined with the need for frequent monitoring and treatment for many years, especially in the COVID-19 era, raises the need to establish an effective, reliable, and safe follow-up and treatment model. This study evaluates the difference in treatment decisions comparing between the gold standard face-to-face clinical examination and virtual evaluation approach based only on visual acuity (VA) and optical coherence tomography (OCT) scans without clinical fundoscopic examination in nvAMD patients. **Methods:** A single-center retrospective cohort study was conducted that compared an original “face-to-face” visit treatment decision regarding the need for anti-vascular endothelial growth factor drug, interval, and treatment regimen based on routine VA, spectral domain OCT imaging, and dilated fundus examination to two “virtual” treatment decisions

based on evaluation of OCT scans and previous medical records before and after revealing VA data on the same nvAMD patients eyes. **Results:** About 169 eyes of 114 patients were included in the study. Forty-nine patients (43%) suffered from bilateral nvAMD and had both eyes included in the study. Agreement between the “face-to-face visit treatment decision” and “virtual treatment decision” was noted in 74.6% and 71.6% eyes before and after revealing the patient’s VA in the study visit, respectively. **Conclusions:** Virtual evaluation results in similar treatment decisions for nvAMD patients compared to standard face-to-face clinical examination.

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Introduction

The gold standard management of patients with neovascular age-related macular degeneration (AMD) requires routine ambulatory monitoring, including visual acuity (VA), clinical fundus examination, as well as auxiliary tests such as optical coherence tomography (OCT) and lately OCT angiography. The treatment decision with anti-vascular endothelial growth factor (anti-VEGF)

Fig. 1. a The first model, the “face-to-face visit,” included patients who underwent routine VA (Snellen chart), SD-OCT imaging, and DFE during their face-to-face visit. The face-to-face visit resulted in a decision regarding the need for anti-VEGF drug, interval, and treatment regimen. **b** The second model, “virtual evaluation,” included evaluation of OCT scans, obtained during the face-to-face visit (as in the first model), and the patient’s previous medical records. After the virtual treatment decision was concluded, the VA data from the same face-to-face visit (also as in the first model) visit were revealed to the physician who could revise his decision.

injections is guided by one of three treatment regimens: fixed dosing, pro re nata (PRN), and treat and extend (TAE) [1–4].

The increasing high prevalence of neovascular AMD in the aging population combined with the need for frequent monitoring and treatment for many years becomes a heavy burden on the patient himself as well as on health systems worldwide [5, 6]. Nowadays, the spread of the COVID-19 pandemic poses unique challenges [7, 8]. Overcrowded clinics where patients move between different stations with diverse personal contact and physical proximity to the physician do not match the new COVID-19 social distancing protocols, especially given the age of the patients that characterize the population suffering from AMD which are prone to develop severe complications from COVID-19 disease [9]. There is therefore an urgent increasing need to establish an effective, reliable, and safe follow-up and treatment model that can lower to minimum the time lengths of each visit, as well as the frequency of these visits. Telemedicine has the potential to present a safer alternative to in-person examination for both the patients and their treating physician.

By now, telemedicine is widely used for screening patients with retinopathy of prematurity [10], diabetic retinopathy [11], and glaucoma [12]. The use of telemedicine

for AMD is mainly as a screening tool [13–15], and there is limited data regarding its use for the management of neovascular AMD patients [16–21]. The aim of this study was to evaluate the difference in treatment decisions comparing between the gold standard face-to-face clinical examination and virtual evaluation approach based only on VA and OCT scans without clinical fundoscopic examination.

Materials and Methods

This retrospective cohort study was conducted at the Tel Aviv Medical Center, Israel – a tertiary medical center – on patients with neovascular AMD who were regularly followed and treated in our ophthalmology retina clinic between 2017 and 2020. After the hospital’s Ethics Committee approval was obtained, demographic and clinical data were collected from the electronic records of each patient. All patients had received at least 3 intravitreal injections of bevacizumab 1.25 mg/0.05 mL (Avastin®; Genentech) or ranibizumab 0.5 mg/0.05 mL (Lucentis®; Genentech) or aflibercept 2 mg/0.05 mL (Eylea®; Regeneron) prior to study entry.

Exclusion criteria were patients under the age of 50 years, patients whose OCT scans were performed outside our retina clinic and could not be retrieved, and patients with any additional retinal vascular disease. Two different treatment decision models (shown in Fig. 1) based on the VA and OCT data acquired during the face-to-face visit were compared.

The treatment decision discussed the need for anti-VEGF treatment, drug modification, treatment regimen (PRN, fixed regimen, and TAE), or observation only management. In the second model, “virtual evaluation treatment decision” and the virtual treatment decision were performed twice and compared, before and after revealing the VA (shown in Fig. 1), in order to evaluate the importance and necessity of the VA exam in the treatment decision. The patients included in this study were examined and evaluated by one of four experienced retina specialists from our retina unit (A.L., M.G., D.Z., and S.S.), and each patient was evaluated by the same retina specialists in both models.

The evaluating retina specialist did not have access to the actual “face-to-face visit treatment decision” from the study visit. Finally, the original “face-to-face visit decision” of each treating physician was compared to the recent two “virtual evaluation treatment decisions” – before and after revealing the VA. This comparison was performed by a different physician (D.Z.), who then performed the statistical analysis of the results, in order to evaluate the agreement between the two models.

Statistical Analysis

Categorical variables were reported as frequency and percentage. Continuous variables were evaluated for normal distribution using histogram and Q-Q plot. Normally distributed continuous variables were reported as the mean and standard deviation, and skewed variables were reported as the median and interquartile range. The McNemar test was used to compare the original treatment decision and the “virtual treatment decision.”

The generalized estimating equations model was used to study the association between each predictor and the “agreement.” All statistical tests were two sided, and p value <0.05 was considered as statistically significant. SPSS software was used for all statistical analysis (IBM SPSS statistics for windows, 2016; IBM Core, Armonk, NY, USA).

Results

A total of 169 eyes of 114 patients were included in the study, and 6 eyes were evaluated twice by different physicians at a different study visit. Patient’s characteristics are listed in Table 1. Agreement between the “face-to-face visit treatment decision” and “virtual evaluation treatment decision,” including a recommendation for the treatment regimen, follow-up time until next visit, and type of drug was noted in 126/169 eyes (74.6%) and the agreement between the “face-to-face visit treatment decision” and “virtual evaluation treatment decision” after revealing the patient’s VA in the study visit was 121 (71.6%). In 50/169 eyes (29.5%), the VA was 20/40 (Snellen chart) or better in both eyes, and of those, in 41 (82%) and 40 (80%) eyes before and after revealing VA, respectively, there was an agreement between the face-to-face visit and the virtual evaluation treatment decisions, a higher percentage than in the entire study population. Correlation

Table 1. Descriptive statistics: demographic data

Patients, n	114
Eyes, n	169
Age, mean $\pm$ SD, years	83.2 (7.3)
Female, n (%)	66 (57.9)
Right eye, n (%)	79 (46.7)
Both eyes suffered from nvAMD, n (%)	49 (43)
BCVA (logMAR), median (IQR), n (%)	0.4 (0.15–1.16)
0–0.3	71 (42)
0.4–1	55 (32.6)
>1	43 (25.4)
Both eyes BCVA (logMAR) $\leq$ 1.3, ¹ n (%)	15 (8.9)
Fellow eye BCVA (logMAR), median (IQR) ¹	0.4 (0.15–1.25)
Fellow eye legally blind, ² n (%)	26 (15.4)
Anti-VEGF drug, n (%)	
Bevacizumab	87 (51.5)
Ranibizumab	26 (15.4)
Aflibercept	45 (26.6)
Observation	11 (6.5)
Treatment regimen, n (%)	
PRN	32 (18.9)
Fixed regimen	75 (44.4)
TAE	62 (36.7)

nvAMD, neovascular age-related macular degeneration; BCVA, best-corrected visual acuity; VEGF, vascular endothelial growth factor; PRN, pro re nata; TAE, Treat and extend; NLP, no light perception; IQR, interquartile range. ¹ Excluding one eye with NLP. ² Legally blind was considered as VA $<20/400$.

between predictors including OCT features and agreement between the two treatment decisions (face-to-face visit and virtual evaluation) are described in Table 2.

The PRN regimen showed a trend toward positive impact on the agreement between the face-to-face visit treatment decision and the virtual evaluation treatment decision, before and after revealing VA ($p = 0.057$, $p = 0.065$, respectively, Table 2). The fixed-regimen protocol showed no effect on the treatment decision agreement between the face-to-face visit and the virtual evaluation (Table 2). The TAE regimen in 39 eyes (62.9%) was found to have a statistically significant negative impact on the agreement between the “face-to-face visit treatment decision” and “virtual evaluation treatment decision” before revealing VA ($p = 0.041$) and a trend ($p = 0.066$) for a negative effect after revealing VA (Table 2). The degree of agreement for each specific drug was evaluated. For ranibizumab, agreement was found only in 16/26 eyes (61.5%) before revealing VA ($p = 0.02$) and in 15/26 eyes (57.7%) after revealing VA ($p = 0.01$). These results suggest a negative effect on the agreement, meaning higher chances for disagreement between the two different treatment decision

Table 2. Predictors in the study visit for agreement between “face-to-face visit decision” and “virtual evaluation decision”

Predictor	Before revealing VA		<i>p</i> value	After revealing VA		<i>p</i> value
	disagreement	agreement		disagreement	agreement	
OCT characteristics						
IRF, <i>n</i> (%)	15 (34.9)	40 (31.7)	0.549	20 (41.7)	35 (28.9)	0.116
Subretinal fluid, <i>n</i> (%)	6 (14.0)	32 (25.4)	0.089	7 (14.6)	31 (25.6)	0.097
Pigment epithelial detachment, <i>n</i> (%)	33 (76.7)	93 (73.8)	0.847	38 (79.2)	88 (72.7)	0.536
Atrophy, <i>n</i> (%)	20 (46.5)	56 (44.4)	0.818	25 (52.1)	51 (42.1)	0.295
Scar, <i>n</i> (%)	20 (46.5)	44 (34.9)	0.109	20 (41.7)	44 (36.4)	0.192
ERM, <i>n</i> (%)	7 (16.3)	33 (26.2)	0.186	9 (18.8)	31 (25.6)	0.307
Subretinal hyper-reflective material, <i>n</i> (%)	6 (14.0)	18 (14.3)	0.878	8 (16.7)	16 (13.2)	0.771
Ellipsoid zone integrity disruption, <i>n</i> (%)	32 (74.4)	87 (69.0)	0.476	37 (77.1)	82 (67.8)	0.202
Central macular thickness, μm	284 (243–331)	274 (248–325)	0.823	277 (248.25–329.75)	284 (243–330)	0.784
Anti-VEGF drug, <i>n</i> (%)						
Bevacizumab	26 (60.5)	61 (48.4)	0.297	28 (58.3)	59 (48.8)	0.348
Ranibizumab	10 (23.3)	16 (12.7)	0.02	11 (22.9)	15 (12.4)	0.01
Aflibercept	6 (14.0)	39 (31.0)	0.048	7 (14.6)	38 (31.4)	0.031
Observation	1 (2.3)	10 (7.9)	0.21	2 (4.2)	9 (7.4)	0.323
Treatment regimen, <i>n</i> (%)						
PRN	4 (9.3)	28 (22.2)	0.057	5 (10.4)	27 (22.3)	0.065
Fixed regimen	16 (37.2)	59 (46.8)	0.64	19 (39.6)	56 (46.3)	0.735
TAE	23 (53.5)	39 (31.0)	0.041	24 (50.0)	38 (31.4)	0.066
Both eyes suffered from nvAMD, <i>n</i> (%)	26 (60.5)	76 (60.8)	0.984	30 (62.5)	72 (60)	0.735
BCVA, <i>n</i> (%)						
≥20/40	15 (34.9)	56 (44.4)	0.534	16 (33.3)	55 (45.5)	0.169
20/40–20/200	16 (37.2)	39 (31.0)		16 (33.3)	39 (32.2)	
<20/200	12 (27.9)	31 (24.6)		16 (33.3)	27 (22.3)	
Fellow eye BCVA, <i>n</i> (%)						
≥20/40	20 (46.5)	57 (46.0)	0.5	21 (43.8)	56 (47.1)	0.827
20/40–20/200	14 (32.6)	33 (26.6)		15 (31.3)	32 (26.9)	
<20/200	8 (18.6)	34 (27.4)		12 (25.0)	31 (26.1)	
Fellow eye legally blind, <i>n</i> (%)	7 (16.3)	19 (15.1)	0.513	7 (14.6)	19 (15.7)	0.769
Both eyes BCVA ≤20/400, <i>n</i> (%)	2 (4.7)	13 (10.3)	3 (6.3)	12 (9.9)		
Treating physician number, <i>n</i> (%)						
A.L.	10 (23.3)	37 (29.4)	0.781	12 (25.0)	35 (28.9)	0.884
M.G.	14 (32.6)	33 (26.2)		15 (31.3)	32 (26.4)	
D.Z.	14 (32.6)	36 (28.6)		15 (31.3)	35 (28.9)	
S.S.	5 (11.6)	20 (15.9)		6 (12.5)	19 (15.7)	

OCT, optical coherence tomography; VEGF, vascular endothelial growth factor; PRN, pro re nata; TAE, treat and extend; nvAMD, neovascular age-related macular degeneration; BCVA, best-corrected visual acuity; IRF, intraretinal fluid.

models in patients treated with ranibizumab (Table 2). For aflibercept, agreement was found in 39/45 eyes (86.7%) before revealing VA ($p = 0.048$) and in 38/45 eyes (84.4%) after revealing VA ($p = 0.031$). These results suggest a positive effect on the agreement, meaning higher chances for agreement between the two different treatment decision models in eyes treated with aflibercept (Table 2). For bevacizumab, agreement was found in 61/87 eyes (70.1%) before revealing VA and in 59/87 eyes (67.8%) after revealing VA, and this was not statistically significant. For eyes which were under observation alone, we found agreement in the treatment decision in 10/11 eyes (90.9%) before revealing VA and in 9/11 eyes (81.8%)

after revealing VA, but this did not reach statistical significance, most probably due to the small number of eyes in this group. Table 3 presents in detail the overlapping treatment decisions between the “face-to-face visit” and the “virtual visit.”

Discussion

To our best knowledge, this is the first study to examine a treatment decision based only on OCT scans and VA as a substitute to the conventional complete ophthalmological examination in patients with neovascular

AMD by comparing the two treatment decisions in a single study visit. In this study, we found agreement between the “face-to-face visit treatment decision” and “virtual evaluation treatment decision” in 126/169 eyes (74.6%) and after revealing the patient’s VA in the study visit in 121/169 eyes (71.6%).

In the minority of cases, in which several treatment decisions were statistically determined as disagreement between the “face-to-face visit” and “virtual evaluation,” they can be regarded as clinically similar. Eyes with a minor deterioration in the anatomical status evaluated by the OCT can be offered to continue with the same drug and same regimen or treated more rigorously with shorter injection intervals or switch to a different drug (Table 3, yellow cells). In contrast, eyes with a slight anatomical or VA improvement can continue treatment with the same fixed regimen or in a less strict regime with less frequent injection (Table 3, blue cells). In addition, a treatment decision of temporary no treatment (PRN regimen) versus less frequent injections (TAE regimen) can be similar at some points during the treatment course (Table 3, purple cells).

We have found that the TAE regimen was considered a statistically significant negative predictor of consent. In most cases, the disagreement when using TAE was between continuing the same injection interval versus 2 weeks of extension/shortening of the therapeutic interval (Table 3).

Since in the TAE regimen, the variable interval is 2 weeks, and these patients attend frequent clinic visits, we assume that the treatment decision to shorten or extend when the OCT changes are minimal has negligible clinical impact on the long-term visual outcome. In contrast, the PRN regimen has shown a trend for positive predictor of consent. We assume that in patients who are monitored so frequently, the treating physician is alert to every minor change in the imaging scans, especially following a treatment interruption, leading to a more acceptable decision to retreat, rather than wait and watch, resulting in a higher agreement between both visits’ treatment decisions (face-to-face vs. virtual evaluation).

In our virtual evaluation model, each eye was evaluated separately and independently of the fellow eye status. This is different from “real life” management. In patients with active nvAMD in both eyes, we frequently need to adjust treatment frequency in one eye to be compatible with the treatment frequency of the fellow eye, usually deciding upon the eye with more active or aggressive disease or the better seeing eye. This may explain some of the disagreement in treatment decisions in our study.

Table 3. Overlapping treatment decisions between the “face-to-face visit decision” and the “virtual evaluation decision”

	Before revealing VA, n (%)						After revealing VA, n (%)					
	virtual evaluation decision						virtual evaluation decision					
Face-to-face visit decision	no treatment	continue with same regimen	more frequent injection	less frequent injection	switch drug	switch to PRN	no treatment	continue with same regimen	more frequent injection	less frequent injection	switch drug	switch to PRN
	23 (13.6)	0	39 (23.1)	0	3 (1.8)	0	23 (13.6)	0	38 (22.5)	0	0	0
No treatment												
Continue with same regimen	0			7 (4.1)	3 (1.8)	0	0		3 (1.8)	8 (4.7)	3 (1.8)	0
More frequent injection	0	1 (0.6)	19 (11.2)	2 (1.2)	0	1 (0.6)	3 (1.8)	2 (1.2)	15 (8.9)	2 (1.2)	0	1 (0.6)
Less frequent injection	2 (1.2)	10 (5.9)	2 (1.2)	41 (24.3)	0	2 (1.2)	2 (1.2)	10 (5.9)	2 (1.2)	41 (24.3)	0	2 (1.2)
Switch drug	0	1 (0.6)	0	0	4 (2.4)	0	0	1 (0.6)	0	0	4 (2.4)	0
Switch to PRN	1 (0.6)	0	0	7 (4.1)	0	0	1 (0.6)	0	1 (0.6)	7 (4.1)	0	0

Overlapping treatment decisions between the “face-to-face visit decision” and the “virtual evaluation decision” according to the different decisions options: the left side describes the agreement before revealing VA, and the right side after revealing VA; gray cells = full agreement (same decisions) in 126/169 (74.6%) eyes before revealing VA, and in 121/169 (71.6%) eyes after revealing VA, yellow cells = disagreement in which one visit offered to continue with the same regimen, and the other offered to treat more rigorously; blue cells = disagreement in which one visit offered to continue with the same regimen, and the other offered to treat less frequently; purple cells = disagreement in which one visit offered not to treat, and the other offered to treat less frequently or switch to a PRN regimen; orange cells = disagreement in which one visit offered to treat more frequently, and the other offered the opposite less frequent injection or switching to the PRN regimen. PRN, pro re nata.

In Israel, in nearly all patients with nvAMD, bevacizumab is used primarily as it is covered by the national health insurance. If treatment response is not adequate or suboptimal, the drug can be switched according to the physician's discretion, to either ranibizumab or aflibercept with a relatively small "out-of-pocket" cost paid by the patient. The treatment decision to switch drugs usually takes into consideration both the financial burden on the patient and that this treatment may be needed for years. During a "face-to-face visit" due to financial restrictions, the patient may request to avoid the switch and therefore change the original physician's treatment decision, while during the "virtual evaluation" as performed in our study, no dialog with the patient was included; therefore, the financial issue had no impact on the final treatment decision. This financial issue can explain the disagreement in 3/169 eyes (1.8%) between a treatment decision to "switch drug" at the virtual evaluation, as opposed to "continue with same regimen" during the face-to-face visit.

We have found that patients treated with ranibizumab are prone to more disagreement in the treatment decision between the face-to-face visit and virtual evaluation, as opposed to patients treated with aflibercept, who are inclined to more agreement in treatment decision between the two models. In stratifying the different treatment decisions in those patients, none of them were fundamentally different or necessarily clinically significant, and this may be due to a relatively small number of participants in each group.

Disagreement between treatment decision models that are considered clinically significant, such as more versus less frequent injections or switching to PRN regimen, were found only in 5 eyes (2.96%) treated with bevacizumab (Table 3, orange cells). An interesting finding in our study was that the revealing of VA results had no significant impact on the "virtual evaluation" treatment decision. Only in 5/169 eyes (2.95%), the VA had an impact on a change made to the original virtual evaluation treatment decision, following access to the VA data. In 4 out of 5 eyes, the VA was worse than 20/400 (Snellen chart) and corresponded with the imaging findings such as scar and/or atrophy. In all of these 4 eyes, the treatment decision after revealing the VA was to perform less frequent injections or not to treat. Only in 1/5 eyes with a good VA of 20/30 (Snellen chart), the disagreement was between continuing same treatment in the virtual evaluation versus shortening injection's interval in the face-to-face visit.

A post hoc analysis of the HARBOR trial already demonstrated no difference in VA outcomes in patients who

were retreated in the PRN arm according to OCT criteria alone versus patients who underwent a fundoscopic examination and were found to have a new retinal hemorrhage but did not meet the OCT/VA re-treatment criteria. The conclusion was that dilated fundus examination (DFE) may not be needed at every visit [22].

These findings may also indicate that VA testing should be performed only in patients complaining of visual deterioration, rather than in all patients. We demonstrate the benefit of performing a "virtual evaluation" in which, even the lack of VA results does not prevent a reliable treatment decision.

In light of the fact that the virtual evaluation treatment decision relies on the OCT image, we analyzed whether specific OCT characteristics had an impact on the treatment decision. Most of the OCT characteristics were not found to be predictive of agreement between the two models, but a trend was found in favor of subretinal fluid as a predictor of agreement. Subretinal fluid is a relatively prominent easily detected finding that is regarded as a sign of disease activity and therefore indicates treatment, as performed in previous studies, such as CATT [23], VIEW [24], and ALTAIRE [25]. To our surprise, no similar results were found for the presence of intraretinal fluid. Hypo-reflective spaces in the retina which were interpreted as intraretinal fluid can also represent degenerative pseudocysts that do not require treatment, thus explaining the lack of expected agreement [26].

Previous studies have evaluated the use of telemedicine in monitoring nvAMD patients. Aweidah et al. [20] evaluated patients virtually with nvAMD who did not report any complaints based on their previous medical files and current OCT scans during quarantine due to COVID-19. Similar to the findings in our study, a consistency between treatment decisions made virtually to the those made in the face-to-face visit was found.

Starr et al. [16] reported on successful telemedicine management of 59 patients with nvAMD based on their OCT scan, VA testing, and DFE, which were performed by their local ophthalmologist. About 8.1% of patients did not receive treatment as recommended. Data regarding the implementation of the retina specialist's treatment decision were not examined in our study.

Tsaousis et al. [19] investigated a virtual evaluation model on patients with nvAMD by comparing two different 2-year periods, one with regular face-to-face visits and the following with virtual evaluation based on VA testing and OCT imaging. Tsaousis et al. [19] found that the percentage of patients with mean VA improvement >15 letters was higher in the virtual evaluation model compared

with the face-to-face examination model, achieved a higher number of appointments, but a shorter visit time, and a slightly smaller number of injections. Our study compared only a single treatment decision.

Andonegui et al. [17] also evaluated the telemedicine model using OCT images and VA data in addition to retinography images, unlike our study. He used yes or no treatment decision with telemedicine evaluation sensitivity and specificity of 96% and 85%, respectively. In our study, we detailed the treatment decision in terms of the need for anti-VEGF treatment, drug modification if needed, and treatment regimen, explaining our lower agreement rate. Trivizki et al. [21] found a 50% time reduction and a higher daily financial return in encounter which included only an undilated OCT exam followed by intravitreal injection compared to the standard encounter, which in our study is parallel to the “face-to-face visit.”

Our results of above 70% agreement between both treatment decisions raise a question regarding the necessity of DFE as part of routine exams in patients suffering from nvAMD. Some concerns are raised when omitting the DFE. The first is under detection of small macular hemorrhages; however, in a post hoc analysis of the HARBOR trial, missed hemorrhages in patients with the absence of fluid on OCT did not impact VA outcomes after 2 years [22].

The second concern is underdiagnosis of other pathologies, such as rise in intraocular pressure or retinal tears and detachments which cannot be evaluated on OCT alone and may occur in patients that undergo repeated intravitreal injections [27, 28]. Therefore, we suggest performing a clinical examination evaluating the intraocular pressure and the entire retina once every 6 months. The future use of widefield OCT which can detect peripheral retinal lesions, might increase the reliability of the OCT instead of DFE [29]. When performing virtual evaluation visits, the physician should be alert to any visual complaint of the patient, especially when it does not coincide with the OCT findings and in these cases, should propose an additional complete clinical examination including VA testing and DFE.

Our study has several limitations. First, this is a retrospective cohort study evaluating a single treatment decision; therefore, we cannot evaluate its value in the long-term follow-up. Second, this study was conducted only on 169 eyes of 114 patients, and of those, 6 eyes were graded twice by different retina specialists at different time points; therefore, our results need to be further analyzed in larger prospective scale studies over a longer period of time.

Third, the evaluation of the patients was conducted by four retina specialists in a real life setting without strict criteria for re-treatment, which may account for some discrepancies in the treatment decision. Also, interobserver agreement was not examined.

Conclusion

The virtual evaluations, if used correctly, are highly valuable by substantially lowering the need for repeated frequent face-to-face visits in the management of this chronic disease, while maintaining COVID-19 strict social distancing regulations.

Statement of Ethics

This study protocol was reviewed and approved by the ethical review board of Tel Aviv Sourasky Medical Center, approval number 0363-20.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

Dana Zvi and Michaella Goldstein: substantial contributions to the conception and design of the work; acquisition, analysis, and interpretation of data for the work; drafting and revising the work; final approval of the version to be published; and agreement to be accountable for all aspects of the work. Dinah Zur, Shula Schwartz, Anat Loewenstein, Shai Cohen, and Avi Saranga: acquisition of data; revising the work; final approval of the work, and agreement to be accountable for all aspects of the work.

Data Availability Statement

All data generated or analyzed during this study are included in this article. Further inquiries can be directed to the corresponding author.

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