CORRELATION BETWEEN BEST CORRECTED VISUAL ACUITY AND SPECTRAL DOMAIN OPTICAL COHERENCE TOMOGRAPHY FINDINGS IN NEOVASCULAR AGE-RELATED MACULAR DEGENERATION

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ABSTRACT:

Background: *Age-related macular degeneration (AMD) is the leading cause of irreversible blindness in patients over 55 years of age in developed countries. Spectral domain optical coherence tomography (SD-OCT) allows for precise anatomic detection of structural changes that may correspond to progression or regression of the neovascular lesions such as intraretinal or subretinal fluid, intraretinal cystoid spaces, retinal pigment epithelium detachment (PED), and choroidal neovascular membranes (CNV).*

Aim of the work: *This study aimed to investigate the relationship between best corrected visual acuity (BCVA) for patients diagnosed with neovascular AMD and their retinal morphological alterations as detected by SD-OCT and their prognostic significance.*

Patients and Methods: *A total forty-three eyes of thirty-nine patients with active subfoveal neovascular AMD were enrolled in this prospective cross sectional observational study and were categorized into two groups: Group A: [new CNV group]: 21 eyes of 19 patients were diagnosed as active subfoveal CNV and didn't receive any form of treatment. Group B: [Old CNV group]: 22 eyes of 20 patients had active subfoveal CNV & received 3 monthly consecutive intravitreal injections of ranibizumab (0.5 mg/0.05 ml) then repeated every two months.*

Results: *There was a statistically significant correlation between BCVA and photoreceptor integrity, central thickness and PED width in group A, whereas group B showed a statistically significant positive correlation between BCVA and CNV and external limiting membrane (ELM) ($r=0.493$ $P=0.020$ and $r=0.644$ $P<0.001$, respectively.*

Conclusion: *Several parameters on SDOCT images showed prognostic value for VA outcome before and after treatment in nAMD patients. A larger, prospective sample will be crucial for defining the relative importance of these parameters.*

Key words: *Age-related macular degeneration, neo-vascular, visual acuity, anti-vascular endothelial growth factors (anti-VEGF).*

INTRODUCTION:

Age-related macular degeneration (AMD) is the leading cause of irreversible blindness in patients over the age of 55 years in developed countries. Approximately 10%–15% of patients with AMD have severe central vision loss [1].

Considering clinical and pathological features, two subgroups of AMD are classically distinguished: dry form (geographic atrophy or non-exudative); which accounts for 90% of cases, wet form (exudative or neovascular form); which accounts for 10% of cases and is the rapidly progressing form of AMD with more severe damage & rapid vision loss [2].

Spectral-domain optical coherence tomography (SD-OCT) is becoming an integral part in the diagnosis and management of age-related macular degeneration [3]. It provides qualitative as well as quantitative assessment of various AMD phenotypes; detecting early non-exudative AMD changes, such as drusen and retinal pigment epithelium (RPE) atrophy [4], as well as exudative AMD findings, such as intraretinal fluid (IRF) or subretinal fluid (SRF) [5], intraretinal cystoid spaces (IRCS) , retinal pigment epithelium detachment (PED), retinal angiomatous proliferation [6], and choroidal neovascular membranes (CNV) [7]. SD-OCT allows for precise anatomic detection of structural changes that may correspond to progression or regression of the neovascular lesions[8].

There is increasing evidence that a decrease in visual acuity secondary to AMD is not primarily due to the submacular choroidal neovascularization itself, but due to the resulting pathomorphological retinal and subretinal changes as accumulation of fluid with intra- and subretinal edema or retinal pigment epithelial detachment[9].

Treatment of new-onset wet age-related macular degeneration should be initiated as soon as possible as recommended by Rauch and his co-workers who found that a duration of visual symptoms less than one month before treatment is associated with a better visual outcome[10].

Assessing the change of the photoreceptor layer integrity before and after treatment would be a useful indicator to predict initial response to treatment and visual prognosis in patients with nAMD [11]. The status of the inner segment/outer segment (IS/OS) junctions is assessed as a hallmark of the integrity of the foveal photoreceptor layer [12]. Disruption of the IS/OS junction on SD-OCT, has been correlated with irreversible reduction in visual function [12, 13].

Weak correlations have been reported between increased volumes of subretinal fluid and decreased contrast sensitivity, although evidence for its association with other visual parameters in nAMD is lacking [14].

There is a correlation between retinal morphology on OCT and visual function [14, 15]. For these reasons, SD-OCT devices have higher and earlier detection rates of CNV activity. For an average patient, earlier detection means a significant gain of vision, which may be equivalent to or better than the gain achieved with most nAMD treatments[16].

This study aimed to investigate the relationship between best corrected visual acuity for patients diagnosed with neovascular age-related macular degeneration and their retinal morphological alterations as detected by spectral domain optical coherence tomography and their prognostic significance.

PATIENTS AND METHODS:

A total forty-three eyes of thirty-nine patients with active subfoveal neovascular AMD were enrolled in this prospective cross sectional observational study and were categorized into two groups; Group A: [Fresh or new CNV group]: 21 eyes of 19 patients were diagnosed as new active subfoveal CNV and didn't receive any form of treatment. Group B: [Old CNV group]: 22 eyes of 20 patients had active subfoveal CNV & from their history received 3 monthly consecutive intravitreal injections

of ranibizumab (0.5 mg/0.05 mL, Lucentis; Genentech, San Francisco, CA) then repeated every two months (patients were examined after the 6th intravitreal injection)

This study was approved by the Institutional Review Board and Ethics Committee of Ain Shams University, Faculty of Medicine.

Inclusion Criteria: Age 50 years or older, Active subfoveal wet AMD, whether treatment naïve or have received treatment in the form of one or more anti-VEGFs and BCVA was > 0.05 using decimal BCVA

Exclusion Criteria: Patients were excluded if they had: BCVA < 0.05 (decimal BCVA), significant media opacity as visually significant cataract, corneal opacities or vitreous haemorrhage, any other ocular disease affecting retina or optic nerve as diabetic retinopathy, retinal vascular disorders, glaucoma or anterior ischemic optic neuropathy, subretinal haemorrhage affecting the center of the fovea, if the size of the haemorrhage is either >50% of the total lesion area or >1 disc area in size, subfoveal fibrosis or atrophy, CNV due to causes other than AMD, such as ocular histoplasmosis, trauma, or pathologic myopia and history of previous treatment, such as laser photocoagulation and radiation.

Methodology:

Full history taking including age, gender, presence of systemic diseases, and the number and type of any previous intravitreal injections of anti-VEGF, for choroidal neovascularization secondary to AMD in group B

All patients were subjected to complete ophthalmological examinations including: BCVA using decimal chart, slit lamp examination of the anterior segment. Intraocular pressure measurement with Goldmann applanation tonometry after installation of topical anaesthetic (benoxinate 0.4%) drops and staining the precorneal tear film with fluorescein stain. Fundus examination through fully dilated pupil with slit lamp biomicroscopy using 90 diopters lens and indirect ophthalmoscopy.

OCT scanning protocol: Optical Coherence Tomography Scanning with spectral domain OCT; Cirrus HD-OCT system; (Carl Zeiss Meditec, Dublin, CA) was performed using the macular cube 512x 128 (figure 1) and built-in 5 raster lines scan protocol (figure 2) with enhanced depth imaging technique.

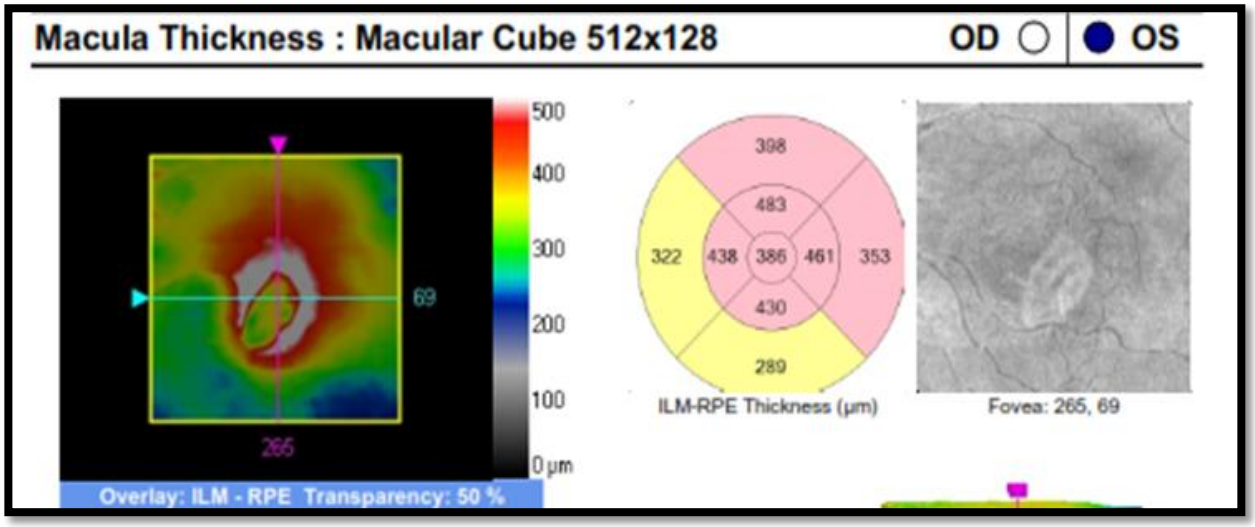

Figure (1): Macular cube 512x128.

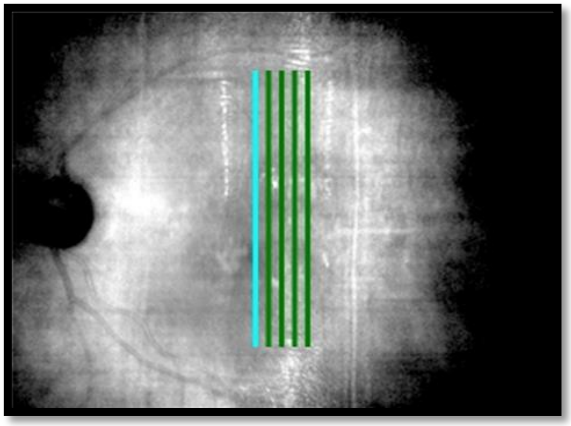

Figure (2): 5 raster lines scan in cirrus SDOCT.

Patients were instructed to fixate on the intrinsic fixation target during the whole process of OCT scanning. If the patient was not fixating well and the center of image was not on center of the fovea, manual adjustment was performed. The OCT scans were performed by a single experienced doctor. The SD-OCT data were analyzed by a single retina specialist.

Statistical Methods: The collected data were coded, tabulated, and statistically analyzed using IBM SPSS statistics (Statistical Package for Social Sciences) software version 22.0, IBM Corp., Chicago, USA, 2013. The best corrected visual acuity was measured using decimal chart then was converted into logMAR (log minimum angle of resolution) equivalent for statistical reasons, where higher logMAR implied lower visual acuity.

Descriptive statistics were done for quantitative data as minimum & maximum of the range as well as mean ±SD (standard deviation) for quantitative normally distributed data, while it was done for qualitative data as number and percentage.

Inferential analyses were done for quantitative variables using Shapiro-Wilk test for normality testing, independent t-test in cases of two independent groups with normally distributed data and, ANOVA test.

In qualitative data, inferential analyses for independent variables were done using Fisher's Exact test for differences between proportions with small, expected numbers. While correlations were done using Pearson correlation for numerical normally distributed data and using spearman rho test for qualitative ordinal data.

ROC curve was used to evaluate the performance of different tests differentiate between certain groups.

Linear regression model was used to find out independent factors affecting certain conditions.

The level of significance was taken at P value < 0.05 is significant, otherwise is non-significant.

Diagnostic characteristics were calculated as follows:

- Sensitivity = (True positive test / Total positive golden) x 100
- Specificity = (True negative test / Total negative golden) x 100
- Predictive positive value = (True positive test / Total positive test) x 100
- Predictive negative value = (True negative test / Total negative test) x 100
- LR+ = (sensitivity/ 1-specificity)
- LR- = (1- sensitivity / specificity)
- Diagnostic accuracy = ([True positive test + True negative test] / Total cases) x 100
- Youden's index = sensitivity + specificity – 1.

RESULTS:

A total forty-three eyes of thirty-nine patients were included in this study, with mean age of 76.1± 6.3 years ranging bet 61.0–90.0 years old. Nineteen patients were males whereas females were 20. These cases were divided into Fresh CNV group (21 eyes of 19 patients) and Old CNV group (22 eyes of 20) patients.

Table (1): SDOCT findings and SDOCT findings among both groups

Parameters		Group A		Group B	
		N	%	N	%
IRCS		11	(52.4%)	8	(36.4%)
SRF		13	(61.9%)	13	(59.1%)
VMA		3	(14.3%)	5	(22.7%)
CNV	33.3%	1	(4.8%)	3	(13.6%)
	66.7%	5	(23.8%)	6	(27.3%)
	100.0%	15	(71.4%)	13	(59.1%)
PED no	0	13	(61.9%)	3	(13.6%)
	1	6	(28.6%)	14	(63.6%)
	2	1	(4.8%)	5	(22.7%)
	3	1	(4.8%)	0	(0.0%)
Parameters		Group A		Group B	
		N	%	N	%
ELM	0.0%	7	(33.3%)	8	(36.4%)
	33.3%	2	(9.5%)	5	(22.7%)
	66.7%	1	(4.8%)	2	(9.1%)
	100.0%	11	(52.4%)	7	(31.8%)
IS/OS	0.0%	2	(9.5%)	4	(18.2%)
	33.3%	5	(23.8%)	3	(13.6%)
	66.7%	2	(9.5%)	15	(68.2%)
	100.0%	12	(57.1%)	6	(27.3%)
RPE	0.0%	2	(9.5%)	2	(9.1%)
	33.3%	5	(23.8%)	13	(59.1%)
	66.7%	13	(61.9%)	1	(4.5%)
	100.0%	1	(4.8%)	8	(36.4%)

Table (1) shows the descriptive data for SDOCT parameters mainly represented in fluid present in different compartments with IRCS in 52.4 % in group A and much less in group B (36.4%). Same number of patients had SRF in both groups with 61.9% and 59.1% in group A and B respectively. CNV occupied the subfoveal area (100%) in 14 cases of group A, 11 cases of group B. PEDs occurred more frequently in patients of group B (19/22), on the other hand only 8 patients in group A showed PEDs. Patients with complete (100%) external limiting membrane (ELM) and IS/OS, disruption were more in group A than in group B with 52.4% and 57.1% and 31.8% and 27.2% respectively. On the other hand, patients showing complete RPE disruption were more among group B (36.4%) than group A (4.8%).

Table (2): Correlation between BCVA log and other variables among group-A

Variables	r	P
^Age	-0.131	0.573
^IOP	0.025	0.915
VM	-0.013	0.955
#CNV	0.409	0.066
#ELM	0.410	0.065
#IS/OS	0.533	0.013*
#RPE	0.399	0.073
^CST	0.451	0.040*
^SPFT	0.427	0.054
#PED	0.081	0.728
^ PED height	0.308	0.174
^PED width	0.343	0.021*

^Pearson correlation, #Spearman correlation, *Significant

On analyzing table (2), there was statistically significant positive correlation between BCVA (logMAR) and IS/OS junction (r=0.533, P=0.013), PED width (r=0.343 P=0.021) as well as central subfield thickness (CST) (r=0.45, P=0.040). However, there was no other statistically significant correlation between logMAR BCVA and other variables.

Table (3): Linear regression model for factors affecting BCVA logMAR among group-A.

Factors	β	SE	P	95% CI	R^2
PED width	0.00032	0.00004	<0.001*	0.00020–0.00043	0.884

β: Regression coefficient, SE: Standard error, CI: Confidence interval,
R^2: Coefficient of determination PED width was a significant factor that increases BCVA logMAR

As shown in **table (3)**, To determine factors affecting baseline BCVA, regression analyses were performed. PED width was a statistically significant (β= 0.00032, P<0.001) factor that led to increase in the logMAR BCVA (decrease in best corrected visual acuity) (95% CI: 0.00020-0.00043). In the group of treatment naïve patients, an increase in PED width would explain 88.4% of increase in logMAR BCVA (R^2=0.88.4). Other correlated factors were CST and IS/OS junction, but they were not strong enough to remain in multivariate regression model.

Table (4): Correlation between BCVA log and other variables among group-B

Variables	R	P
^Age	-0.076	0.737
^IOP	0.169	0.451
#CNV	0.493	0.020*
#ELM	0.644	<0.001*
#IS/OS	0.316	0.151
#RPE	0.230	0.302
^CST	0.179	0.425
^SPFT	-0.293	0.185
#PED	-0.237	0.289
^ PED height	-0.247	0.269
^PED width	-0.165	0.462

Total=22, ^Pearson correlation, #Spearman correlation, *Significant

As shown in table (4), there was a statistically significant positive correlation between BCVA logMAR and the following variables only, CNV and ELM (r=0.493 P=0.020 and r=0.644 P<0.001, respectively).

Table (5): Linear regression model for factors affecting BCVA log among group-B

Factors	β	SE	P	95% CI	R^2
CNV	0.117	0.040	0.008*	0.034–0.200	0.814
ELM	0.173	0.050	0.003*	0.068–0.278	

β: Regression coefficient, SE: Standard error, CI: Confidence interval, R^2: Coefficient of determination

Analyzing table (5), applying the multivariate linear regression model for parameters affecting logMAR BCVA, CNV and ELM were statistically significant (P=0.008 and P=0.003, respectively) factors that led to increase in the BCVA logMAR (95% CI: 0.034–0.200 and 0.068–0.278, respectively). The presence of both factors can explain 81.4 % of increase log MAR BCVA. Other variables were not strong enough to remain in the regression formula.

Table (6): Diagnostic characteristics of complete ELM disruption (100.0%) in predicting BCVA logMAR ≥0.5 in group-B

Characters	Value	95% CI
Sensitivity	66.7%	29.9%–92.5%
Specificity	92.3%	64.0%–99.8%
Diagnostic accuracy (DA)	81.8%	59.7%–94.8%
Youden's index	59.0%	24.9%–93.0%
Positive Predictive value (PPV)	85.7%	42.1%–99.6%
Negative Predictive value (NPV)	80.0%	51.9%–95.7%
Positive likelihood ratio (LR+)	8.67	1.25–60.24
Negative likelihood ratio (LR-)	0.36	0.14–0.92
Diagnostic odd ratio (LR)	24.00	2.04–282.67
Kappa	0.611	0.274–0.948

CI: Confidence interval

As shown in table (6), complete disruption of ELM had high specificity (92.3%) and moderates other characteristics in predicting BCVA ≥0.5 in group-B. ELM has a positive predictive value of 85.7 % in treated cases of active wet AMD.

DISCUSSION:

To provide means of prognosis and predict the factors affecting the BCVA for patients with active subfoveal CNV using SDOCT, this study was conducted to assess the retinal layers in the foveal area and observe the morphological changes associated with this disease and link those findings to the BCVA at the time of examining the patient, both before and after receiving treatment.

Fresh CNV group showed no clinically significant factors affecting BCVA however, positive correlation existed between CST, IS/OS disruption, PED width and BCVA (logMAR), and PED width was the only factor that can predict an increase in BCVA (logMAR) ≥1.

Old CNV group had IRCS, presence of PED, and ELM disruption as clinically significant factors and positive correlation existed between CNV size, ELM disruption and logMAR BCVA.

Likewise, **Roberts et al. (2014)**[17] who quantitatively analyzed morphological features in eyes with neovascular AMD at baseline, after 12 months, and after 24 months of intravitreal ranibizumab treatment and performed a structure/function correlation between CST and visual acuity at baseline, 12 months, and 24 months. Visual acuity showed a significant dependence on CST only at baseline.

Keane et al. (2008a)[18] found a limited inverse correlation between visual acuity and an increased retinal thickness at the foveal center.

Alternatively, several studies have reported that CST was not necessarily correlated with visual function in wet AMD **(Hayashi et al.,2009)**[12].

Correlations failure may be due, at least in part, to the frequent inaccuracy of retinal thickness measurements provided by OCT image analysis software. In addition, the older Stratus OCT systems typically used in these trials use the presumed IS/OS junction, rather than the RPE, as their outer retinal boundary. Manual segmentation of OCT images allows accurate measurement of retinal thickness, as well as allowing quantification of any morphologic space of interest.

Even the automated boundary detection used by commonly available OCT software is known to frequently fail to correctly identify the borders of the retina, as the morphology in neovascular AMD is very complex.

In our study CST in patients after receiving treatment was not associated with improved visual function highlighting the necessity of additional morphologic parameters to provide identification of the functional and structural retinal changes of nAMD patients undergoing antiangiogenic therapy. In this aspect our results were similar to the results by **Roberts et al. (2014)**[17].

On the contrary one year after ranibizumab treatment VA assessment in a study by **Ristau et al. (2014)**[19] was inversely correlated with the neurosensory retina in the ETDRS central subfield, as well as with the photoreceptor layer and the outer nuclear layer**.** However, they included a larger sample of patients and used a different SDOCT machine (Spectralis OCT, Heidelberg Engineering, Heidelberg, Germany) which specify retinal boundaries for retinal thickness measurement between ILM and outer border of RPE not the inner border.

Our study correlated CNV size to BCVA (logMAR) in patients after receiving anti VEGFs However, this parameter was not statistically significant in both groups.

On the contrary, **Keane et al. (2008a)**[18] found that Visual acuity demonstrated a statistically significant correlation with thickness of subretinal hyperreflective material (SRHM) at the fovea and with the total volume of SRHM present in treatment naïve patients. This may be due to the fact that he stratified the CNV into further subgroups according to its type, which we lacked in this study.

Opposing our study **Ristau et al (2014)**[19] concluded that Subretinal hyperreflective material did not show significant correlations with VA in patients who received ranibizumab treatment**.**

Segal et al. (2016)[20] did not find any significant correlation between vision and PED (regarding height and width**).**

Ristau et al. (2014)[19] reported that PED by themselves do not seem to explain variations in VA whether at baseline or after treatment**.**

Keane et al (2008)[15] proved visual acuity was also not significantly correlated with the total volume of PED, although a weak negative correlation was found between thickness of PED at the foveal center point and visual acuity**.**

These differences may be due to different sample size of patients and different SDOCT machine used.

This study analyzed the patho-morphological characteristics of neovascular AMD with a focus on microstructural foveal alteration and its correlation to visual function.

It is generally believed that a visible IS/OS may be a hallmark of the integrity of the foveal photoreceptor layer. A very limited number of studies assessed the relationship between SDOCT structural changes and BCVA at the time of diagnosis of patients with active subfoveal wet AMD.

Our results showed inverse correlation between BCVA and IS/OS disruption. These findings were Consistent with **Landa et al (2011)**[21] study which was conducted to investigate the relationship between the IS-OS junctional layer integrity and the overlying retinal sensitivity and BCVA in patients with dry and wet forms of AMD. They reported that retinal sensitivity and BCVA were inversely correlated with the integrity of IS/OS junction at the fovea.

On the contrary, **Moutray et al. (2008)** [22] reported that they did not find any statistically significant association or correlation between OCT parameters and visual acuity. It might be attributed to the fact that the OCT used was OCT III, an older version of time domain OCT machines proven not to be reproducible in providing accurate quantification of retinal layers, where in our study SDOCT cirrus which allows better detection of the alterations typically related to choroidal neovascularization.

Hayashi et al (2009)[12] reported that the integrity of the foveal IS/OS was closely associated with the final visual acuity in neovascular AMD after successful photodynamic therapy but they had different inclusion criteria than that in our study Similarly, **Sayanagi et al (2009)** [13] reported that the status of the IS/OS after anti-VEGF therapy was correlated with best-corrected visual acuity (BCVA) and mean change in vision.

In our study ELM integrity was a significant factor which correlated positively with BCVA (logMAR) in patients who received anti-VEGFs but not in treatment naïve patients. ELM disruption was also a significant factor predictive of visual prognosis in previously treated group along with CNV size.

Our study did not reveal ELM to be of significance in treatment naïve patients and this could be attributed to the relatively small sample size and that other factors were strong in determining the correlations and the regression data.

Our study revealed clinical significance of intraretinal cysts in relation to BCVA only in the treated group while it was clinically insignificant in treatment naïve group.

On the contrary **Schmidt-Erfurth et al. (2015)**[23] and others reported that Intraregional cysts were the only morphologic parameter that correlated statistically significantly with baseline BCVA as well as BCVA after and during different treatment strategies. Their presence in all study stages negatively impacted the BCVA independent of the treatment strategy.

Kashani et al. (2009)[24] failed to detect a significant relationship between cystoid space volume and visual acuity and failed to improve the strength of retinal thickness–visual acuity correlation through adjustment for intraretinal cystoid space thickness.

Our study revealed SRF and IRF to be of no clinical significance in relation to BCVA in both groups of patients.

Similarly, **Keane et al (2008)** [15] **Ristau et al. (2014)**[19] reported same results in treatment naïve patients and patients who received anti-VEGFs.

Cuilla et al. (2015)[25] proved the contrary to this where VMT and VMIA were not correlated to BCVA. This may be attributed to the different categorisation taken for the abnormalities along with a large sample size with different inclusion and exclusion criteria.

Study limitations:

The present study is limited by its cross-sectional design, and it is possible that more robust associations between measures of vision and OCT will be detected in longitudinal data sets.

The relationships between SDOCT parameters and visual improvement should be further evaluated with a large-scale prospective study as our sample was quite small.

Being a cross-sectional study, the way in which changes in visual acuity correspond to changes in OCT parameters over time was not examined. Furthermore, accurate data was not available regarding disease duration, time lapse to diagnosis.

Absence of standardized protocol and software for quantification of features apparent on SDOCT images made this study more of a qualitative type.

Conclusions

In conclusion, our study suggests that SD-OCT biomarkers are suitable to predict VA in patients with nAMD, and to guide the treatment and follow-up of these patients, improving the quality of nAMD management. Increased CST, disrupted IS/OS junctions and wider PEDs warrants poor visual outcome for newly diagnosed patients. ELM integrity and CNV size are two factors with obvious impact on visual function after receiving intravitreal anti-VEGFs treatment in patients with nAMD.

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العلاقة بين قياس أفضل تصحيح لحدة الإبصار ونتائج التصوير المقطعى الضوئى المترابط ذو النطاق الطيفى لحالات ضمور الماقولة الوعائى المرتبط بتقدم العمر

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المقدمـــة: يعتبر ضمور الماقولة المرتبط بتقدم العمر السبب الرئيسى المؤدى إلى العمى والإعاقة البصرية لدى المرضى الذين تتجاوز أعمارهم ٥٥ عاماً فى الدول المتقدمة. والجدير بالذكر أن ما يقرب من ١٠-١٥% من المرضى المصابين بضمور الماقولة المرتبط بتقدم العمر يعانون من فقدان شديد للرؤية المركزية.

يصنف هذا المرض وفقاً للسمات الإكلينيكية والباثولوجية إلى مجموعتين فرعيتين: ضمور الماقولة الجاف أوغير النضحى والضمور الرطب وهو الشكل النضحى والذى يحدث نتيجة تكون أوعية دموية جديدة فى منطقة الشبكية ويمثل هذا النوع الشكل السريع التقدم لضمور الماقولة المرتبط بتقدم العمر مع حدوث ضرر شديد وفقدان سريع للرؤية.

لقد أصبحت تقنية التصوير المقطعى الضوئى المترابط ذو النطاق الطيفى جزءً لا يتجزأ من إجراءات التشخيص والعلاج لحالات ضمور الماقولة الوعائى المرتبط بتقدم العمر. وتتميز هذه التقنية بإمكانية الحصول على تقييم نوعى وكمى لمختلف الأنماط الظاهرية لهذا المرض، حيث يساعد فى الكشف عن التغيرات المبكرة لضمور الماقولة غير النضحى.

الهـدف من الدراســـة: تهدف هذه الدراسة إلى استقصاء العلاقة بين أفضل تصحيح لحدة الابصار لدى المرضى المصابين بضمور الماقولة الوعائى المرتبط بتقدم العمر وبين التغيرات المورفولوجية بالشبكية والتى تظهر من خلال التصوير المقطعى الضوئى المترابط ذو النطاق الطيفى وأهميتها فى التنبؤ بمسار المرض.

المرضـــى وطـــرق البحث: سوف تشتمل هذه الدراسة علي اربعون عيناً للحالات المصابة بضمور الماقولة الوعائى المرتبط بالعمر و سيتم تقسيم المرضي الي مجموعتين:

- مجموعة أ

تشمل هذه المجموعة المرضي الخاضعين للتشخيص حديثاً ولم تتلق أي شكل من أشكال العلاج.

- مجموعة ب

تشمل هذه المجموعة المرضي الخاضعين للعلاج فى صورة حقن واحد أو أكثر من الأدوية المضادة للأمراض وعائية المنشأ داخل الجسم الزجاجى.

طريقة إجراء البحث: سوف تخضع الحالات لإجراء التصوير المقطعى الضوئى المترابط ذو النطاق الطيفى باستخدام اجهزة سيرس.

النتائج : كشف تحليل الانحدار الخطي للعوامل التي تؤثر على أفضل حدة بصرية مصححة في دراستنا أن عرض انفصال الطبقة الصبغية كان العامل المهم الوحيد اللذي تنبأ بتدهور أفضل حدة بصرية مصححة عندما يتجاوز عرض انفصال الصباغ الظهاري ١٨٠٠ ميكرومتر في مرضى المجموعة أ فقط.

أظهرت نتائجنا وجود علاقة عكسية بين أفضل حدة بصرية مصححة و سلامة الروابط بين القطع الداخلية والخارجية لطبقة المستقبلات الضوئية.

الخلاصة : لقدوضحت هذه الدراسة اهمية التصوير المقطعى الضوئى المترابط ذو النطاق الطيفى في الكشف المبكر والدقيق لنشاط الأغشية الدموية المستحدثة ويمثل الكشف المبكر لهذه الحالات أداة فعالة لاسترجاع القدرة على الإبصار والذى قد يوازى أو يفوق ما يمكن تحقيقه من نتائج من خلال معظم العلاجات الأخرى المستخدمة فى حالات ضمور الماقولة الوعائى المرتبط بتقدم العمر.