Choroidal Thickness and Visual Outcomes After 2 Years of Treat-and-Extend Protocol in Neovascular Age-Related Macular Degeneration

Espessura Coroideia e Resposta Funcional Após 2 Anos de Tratamento de Acordo com o Regime *Treat-and-Extend* na Degenerescência Macular da Idade Neovascular

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ABSTRACT

INTRODUCTION: To investigate whether baseline subfoveal choroidal thickness (SFCT) is correlated with functional response to anti-vascular endothelial growth factor (VEGF) treatment in neovascular age-related macular degeneration (nAMD).

METHODS: We conducted a retrospective observational study using data from the national Retina Study Group database. The study included 82 eyes from 67 treatment-naïve patients diagnosed with typical nAMD. Included eyes received a loading dose of 3 anti-VEGF intravitreal injections (ranibizumab, bevacizumab or aflibercept) and were managed thereafter following a treat-and-extend (TAE) regimen. Subfoveal choroidal thickness (SFCT) measurements were obtained at baseline, 6, 12, and 24 months. We classified the eyes into thin, medium, and thick choroid groups based on the mean and one standard deviation of baseline SFCT measurements. The functional response was assessed through best-corrected visual acuity (BCVA) evaluations using the ETDRS scale.

RESULTS: The study found a significant decrease in SFCT and improvement in BCVA at the 24-month mark compared to baseline (p-value <0.001). Among the studied eyes, the mean baseline SFCT was 234.5 ±79.2 μm, decreasing by 9.2% over the 24-month period (p-value <0.001). The thin choroid group exhibited a smaller SFCT decrease compared to the thick choroid group (p-value <0.001). BCVA improved from a baseline value of 50.6 ± 17.8 to 59.4 ± 17.5 ETDRS letters after 24 months, corresponding to an overall gain of 8.8 ± 18.3 ETDRS letters (p-value= 0.001). Eyes with thinner choroids at baseline showed a higher gain on BCVA, +15.2 letters at 24 months, compared to medium and thick choroid groups (+7.8 and +5.9 letters at 24 months, respectively), although this difference did not reach statistical significance (p-value > 0.05).

CONCLUSION: Long-term anti-VEGF treatment in nAMD patients following a TAE regimen is associated with significant SFCT decrease and BCVA improvements. Thicker baseline choroids may be linked with poorer functional outcomes at 24 months. Further investigations with larger sample sizes are needed to validate this data and better understand the role of different

anti-VEGF agents and treatment regimens in nAMD patients' functional outcomes.

KEYWORDS: Choroidal Neovascularization; Intravitreal Injections; Macular Degeneration/drug therapy; Wet Macular Degeneration/drug therapy; Vascular Endothelial Growth Factor A; Visual Acuity.

RESUMO

INTRODUÇÃO: O presente estudo tem como principal objetivo correlacionar a espessura coroideia basal com a resposta funcional ao tratamento anti-fator de crescimento endotelial vascular (VEGF) em doentes com degenerescência macular da idade neovascular (nDMI).

MÉTODOS: Análise retrospectiva, incluindo 82 olhos de 67 doentes *naïve*, selecionados a partir da base de dados do Grupo de Estudos da Retina. Os olhos incluídos foram tratados com uma dose de carga de 3 injeções de anti-VEGF (ranibizumab, bevacizumab ou aflibercept) e posteriormente de acordo com o regime de *treat-and-extend* (TAE). A espessura coroideia subfoveal (ECSF) foi medida aos 0, 6, 12 e 24 meses. Os olhos incluídos foram categorizados em três grupos: coroide fina, média e espessa, de acordo com a espessura basal média e um desvio padrão. A resposta funcional foi avaliada utilizando a melhor acuidade visual corrigida (MAVC) medida com a escala ETDRS.

RESULTADOS: Observamos uma diminuição da ECSF e uma melhoria da MAVC após 24 meses de tratamento (p <0,001). A ECSF inicial média dos olhos estudados, 234,5 ±79,2 µm, reduziu 9,2% ao longo do período de 24 meses (p <0,001). O grupo de coroides finas apresentou uma menor diminuição da ECSF em comparação com o grupo de coroide espessas (p-value <0,001). Globalmente verificou-se uma melhoria da MAVC de 50,6 ± 17,8 para 59,4 ± 17,5 letras ETDRS, correspondendo a um ganho de 8,8 ± 18,3 letras ETDRS ao longo do período de seguimento (p = 0,001). O grupo de coroides finas obteve um maior ganho da MAVC aos 24 meses (+15,2 letras) comparativamente com os grupos de coroide média e espessa (+7,8 e +5,9 letras, respetivamente), embora esta diferença não tenha atingido significância estatística (p > 0,05).

CONCLUSÃO: O tratamento anti-VEGF em olhos com nDMI de acordo com o regime TAE está associado a uma diminuição significativa da ECSF e a uma melhoria da MAVC. Coroides mais espessas à apresentação parecem estar associadas a um pior prognóstico visual aos 24 meses. São necessários mais estudos com amostras maiores para validar estes dados e esclarecer o papel dos diferentes agentes anti-VEGF e regimes de tratamento nos resultados visuais dos doentes com nDMI.

PALAVRAS-CHAVE: Acuidade Visual; Degenerescência Macular; Degenerescência Macular Exsudativa; Fatores de Crescimento do Endotélio Vascular; Injeções Intravítreas; Neovascularização de Coroide.

INTRODUCTION

Age-related macular degeneration (AMD) is a leading cause of severe central vision loss worldwide.[1] Neovascular AMD (nAMD) involves the formation of macular neovascular membranes (MNV), resulting from vascular and associated tissue invasion into the outer retina, subretinal space, or sub-RPE space.[2] This ingrowth leads to retinal leakage, bleeding, and scarring, progressively causing severe vision loss.[3]

Anti-vascular endothelial growth factor (VEGF) agents have become the standard of care in the treatment of MNV.[4]

The pathogenesis of AMD is complex, and multifactorial. The emergence of MNV in AMD has been connected with potential hypoperfusion and ischemia in the RPE and photoreceptor layer due to choroidal vascular insufficiency. Choroid hypoperfusion may be associated with decrease in its thickness.[5,6]

Despite its undeniable benefits in the treatment of MNV, anti-VEGF agents have been linked with reduced survival of retinal glial and neural cells, along with decreased retinal and choroidal perfusion.[7–9] Long term anti-VEGF treatment has been shown to reduce choroidal thickness.[10–12]

A decrease in choroidal thickness in nAMD eyes treated with aflibercept has been linked to improved visual outcomes in patients with polypoidal choroidal vasculopathy but not in patients with nAMD at 12-months.[13] Contradictory data surrounds the impact of baseline choroidal thickness and the extent of its decrease on functional response to anti-VEGF treatment.[14–16] A recent investigation by Song *et al* found that thicker choroids at baseline were associated

with poorer anatomical response following three initial anti-VEGF injections in exudative AMD patients.[17] Conversely, thinner choroids could be linked to long-term macular atrophy and subsequent poor vision, underscoring the significance of monitoring choroidal thickness during anti-VEGF treatment.[18,19]

This study aims to explore the potential correlation between baseline subfoveal choroidal thickness (SFCT) and the long-term functional response to anti-VEGF treatment.

METHODS

PARTICIPANTS

This retrospective observational study involved the review of medical records from consecutive patients diagnosed with active subfoveal MNV secondary to AMD. Patients were treated at a single center (Hospital de São João, Porto, Portugal) and were selected from the national Retina Study Database (retina.com.pt). Inclusion criteria comprised treatment-naïve patients with a minimum follow-up of 24 months with high-quality spectral domain optical coherence tomography (SD-OCT) scans and best corrected visual acuity measurements (BCVA) recorded at baseline, 6, 12, and 24 months of follow-up. Patients received a loading dose of three consecutive monthly intravitreal injections of anti-VEGF agents, such as ranibizumab, bevacizumab, or aflibercept. Subsequent treatment followed a treat-and-extend regimen (TAE). No patients underwent cataract surgery, vitrectomy, or photodynamic therapy during the follow-up period. Patients with pathological myopia or any other ocular diseases that could confound the results were excluded.

VARIABLE MEASUREMENTS

Primary outcome measures included BCVA, SFCT and central retinal thickness (CRT). These parameters were assessed at four time-points: baseline, 6, 12, and 24 months. BCVA was assessed using the ETDRS scale. SFCT was considered as the perpendicular distance from Bruch's membrane to the choroidoscleral interface, manually assessed on a horizontal line-scan image centered at the fovea using the caliper tool in the Heidelberg OCT software (Spectralis, Heidelberg Engineering Inc., Heidelberg, Germany). CRT was determined as the central value on the retinal thickness map using OCT software (Spectralis, Heidelberg Engineering Inc., Heidelberg, Germany). Mean values for BCVA, SFCT and CRT at the 6, 12, and 24 months were calculated based on the nearest visit between 5-7 months, 11-13 months, and 23-25 months, respectively.

Secondary outcome measures included the total number of intravitreal injections over the 24-month follow-up.

BASELINE CHOROIDAL THICKNESS GROUPS

Studied eyes were categorized into three choroidal thickness subgroups (thin, medium, and thick choroids) based on the standard deviation (SD) of mean thickness. The thin choroid group comprised eyes with SFCT below 1 SD from the mean, while thick choroids were defined as having SFCT above 1 SD from the mean. Eyes with SFCT within 1 SD were considered to have medium thickness choroids.

INTRAVITREAL INJECTIONS OF ANTI-VEGF AND A TREATMENT REGIMEN

Treatment-naïve eyes received intravitreal injections of anti-VEGF agents (ranibizumab, bevacizumab, or aflibercept) administered by different ophthalmologists trained in the procedure. Patients initiated treatment for nAMD based on reduced visual acuity associated with active MNV as assessed by SD-OCT and/or angiography, and the absence of permanent structural macular lesions (scarring/fibrosis). The majority of patients began treatment with bevacizumab. Ranibizumab or aflibercept were used as the first-line anti-VEGF agents in monocular patients. The choice of the anti-VEGF agent was guided by the most current clinical practice in our department and aligned with the implemented local clinical protocol for the treatment of nAMD. Patients were treated according to the TAE approach, aiming to balance disease control and injection frequency.

Anti-VEGF agent switches were considered in cases of absent or partial anatomical response. Partial anatomical response was defined as a reduction, but not complete resolution, in the extent of subretinal fluid (SRF) and/or intraretinal fluid (IRF) after six consecutive monthly intravitreal injections of the same anti-VEGF agent, including the loading dose. Absent anatomical response refers to the lack of change or an increase in SRF and/or IRF on OCT imaging.

ENDPOINTS ANDS TATISTICAL ANALYSIS

The primary endpoint assessed and explored the relation between SFCT and BCVA changes during the 24-month follow-up.

The secondary endpoint explored the relationship between BCVA, SFCT and CRT changes and the number of intravitreal injections.

Statistical analysis was conducted using R software version 4.3.1 for MacOS (R Foundation for Statistical Computing, Vienna, Austria). Quantitative variables are presented as mean ± standard deviation, while qualitative variables are expressed as absolute frequencies and percentages. Statistical significance was defined as a *p*-value less than 0.05.

RESULTS

Our study included 82 eyes from 67 patients diagnosed with nAMD. We divided the eyes into three groups according to mean SFCT and one standard deviation: thin, medium, and thick. These groups consisted of 15, 53, and 14 eyes, respectively. The thin and thick choroid groups had SFCT values below 155 μm and above 314 μm, respectively.

The medium-thickness choroid group had SFCT values between 155 µm and 314 µm.

Table 1 displays data regarding demographic characteristics, baseline BCVA, baseline morphological parameters, and distribution of anti-VEGF treatments between choroid groups.

DEMOGRAPHIC CHARACTERISTICS

The average age was 78.12 ± 8.05 years (range, 53-92 years), with a gender distribution of 55 females (67%) and 27 males (33%). The median age was 80, 80 and 79 years for thin, medium, and thick groups respectively. Our analysis revealed no significant age difference between genders (*p*-value = 0.721). Furthermore, we found no statistically significant differences in age across different groups (*p*-value = 0.836).

Although we noted a trend in gender distribution between groups, it did not reach statistical significance (*p*-value = 0.053). The thin group exhibited a relatively higher female-to-male ratio (12:2) compared to the other groups.

BASELINE VISUAL AND MORPHOLOGICAL CHARACTERISTICS

The mean baseline BCVA for the thin, medium, and thick groups was 51.4 ± 13.0 ETDRS letters, 50.26 ±19.1 ETDRS letters, and 51.07 ±14.8 ETDRS letters, respectively. Fig. 1 displays the baseline BCVA across the three distinct choroidal thickness groups. No statistically significant difference in the initial BCVA between the SFCT groups was found (*p*-value =0.958).

The mean baseline SFCT for the thin, medium, and thick groups was 121.5 ± 20.4 µm, 233.7 ± 41.9 µm, and 358.4 ± 28.8 µm, respectively (*p*-value < 0.001).

We observed no statistically significant differences in baseline BCVA among the groups (*p*-value = 0.958), suggesting comparable baseline visual acuity across different baseline choroidal thicknesses.

The mean baseline CRT for the thin, medium, and thick groups was 384.7 ± 95.4 µm, 391.2 ± 132.2 µm, and 389.7 ± 144.4 µm, respectively. Baseline CRT did not show statistically significant differences among the groups (*p*-value = 0.827).

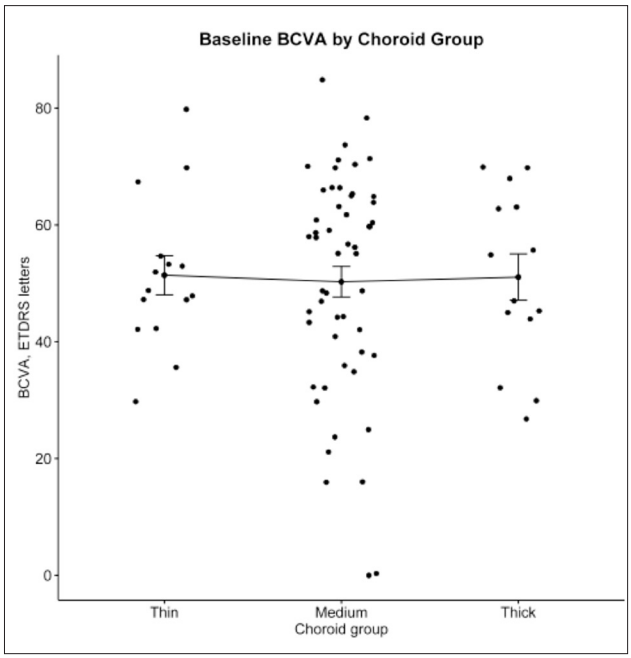

Figure 1. Baseline best corrected visual acuity (BCVA) distribution by choroid group.

BCVA AND SFCT CHANGES

Figs. 2 and 3 illustrate the changes in BCVA and SFCT over the 24-month follow-up period, respectively.

Our analysis revealed a significant improvement in BCVA and a decrease in SFCT at the 24-month mark compared to baseline (*p*-value <0.001).

BCVA increased from a baseline value of 50.6 ± 17.8 ETDRS letters to 59.4 ± 17.5 ETDRS letters after 24 months of anti-VEGF intravitreal injections, corresponding to an overall gain of 8.8 ± 18.3 ETDRS letters (*p*-value = 0.001). When we look at the choroid groups, the thin group showed the most significant BCVA improvement, with an average increase of 15.2 ± 15.5 ETDRS letters. This was compared to increases of 7.8 ± 19.1 and 5.9 ± 18.3 in the medium and thick groups respectively, although this difference was not statistically significant (*p*-value = 0.09).

Table 2 illustrates the changes in visual acuity across

Table 1. Baseline characteristics.

	Thin choroids	Medium choroids	Thick choroids	Global	*p*-value
Sample, n (%)	15 (18%)	53 (65%)	14 (17%)	82	NA
Age, mean ±SD, years	79.7 ± 6.1	77.7 ± 8.7	78.1 ± 7.5	78.1 ± 8.1	0.836
Gender, female: male	5:10	38:15	12:2	55:27	0.053
Baseline BCVA, ETDRS letters	51.4 ± 13.0	50.26 ± 19.1	51.07 ± 14.8	50.60 ± 17.2	0.958
Baseline SFCT, µm	121.5 ± 20.4	233.7 ± 41.9	358.4 ± 28.8	234.5 ± 79.2	<0.001*
Baseline CRT, µm	384.7 ± 95.4	391.2 ± 132.2	389.7 ± 144.4	389.8 ± 126.3	0.827
Number of anti-VEGF treatments	17.5±3.4	21.0±3.5	17.9±4.4	19.8±3.9	0.001*

Thin choroids, thin choroid group defined as SFCT< 155 µm. Thick choroids, thick choroid group defined as SFCT> 314 µm. Medium choroids, medium thickness choroid group defined as SFCT 155-314 µm. BCVA, best corrected visual acuity; ETDRS, Early Treatment Diabetic Retinopathy Study; SFCT, subfoveal choroidal thickness; CRT, central retinal thickness; NA, not applicable. **p*-value <0.05.

Table 2. Best corrected visual acuity (ETDRS letters) at each time-point for each choroid group.

	Baseline	6 months	12 months	24 months
Thin Choroids	51.4 ± 13.0	62.33 ± 11.2	62.87 ± 11.6	66.60 ± 13.6
Medium Choroids	50.26 ± 19.1	56.64 ± 16.5	56.83 ± 16.4	58.06 ± 18.2
Thick Choroids	51.07 ± 14.8	58.36 ± 16.6	62.36 ± 16.5	56.93 ± 18.6

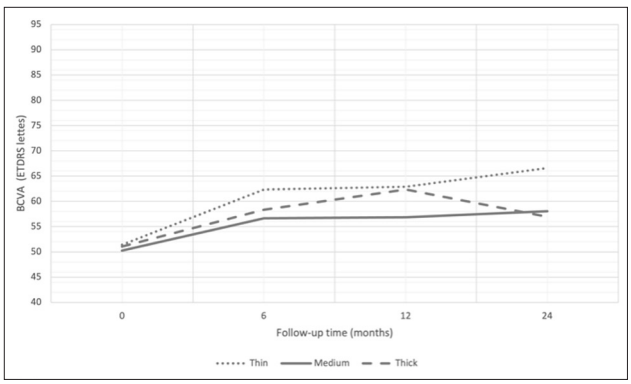

Figure 2. Changes in best corrected visual acuity (BCVA) by group over the 24-month follow-up time.

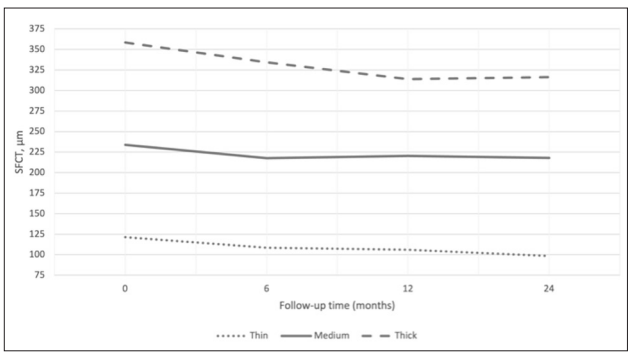

Figure 3. Changes in subfoveal choroidal thickness (SFCT) by group over the 24-month follow-up time.

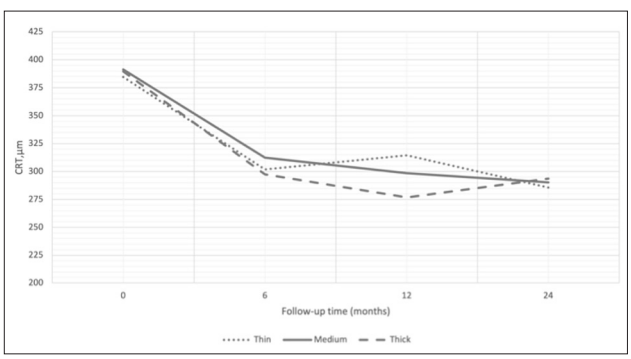

Figure 4. Changes in central retinal thickness (CRT) by group over the 24-month follow-up time.

the three choroid groups. The medium group consistently improved in BCVA throughout the study. The thin group also showed an increase in BCVA at all time-points, with the most significant increase observed over the study period. The thick group initially increased in BCVA in the first 12 months, but a decrease was noted between the 12 and 24-month marks. At the 12-month mark, BCVA was similar for both the thin and thick groups. However, while the thin group continued to show an increase up to 24 months, the thick group's BCVA decreased after this point.

In all groups, BCVA improvements were most pronounced in the first six months of anti-VEGF treatment. The pairwise t-tests conducted at each time-point (0, 6, 12, and 24 months) did not reveal any statistically significant differences in BCVA among the thin, medium, and thick choroid groups (p-value > 0.05 at all time-points).

Among the 82 studied eyes, SFCT decreased 21.6 ±36.7 µm (9.2%) from baseline (p-value <0.001). The reduction in SFCT was most prominent during the first six months, with an average decrease of 17.7 ±5.7 µm across all SFCT groups. Thin choroid group exhibited a smaller SFCT decrease (22.9 ±5.4 µm) compared to the thick choroid group (42.1 ±14.3 µm), with p-value <0.001.

No significant correlation was observed between the decrease in SFCT and BCVA improvement (rho= -0.068, p-value=0.5418).

ANATOMIC OUTCOMES

CRT decreased from 389.6 ±126.3 µm at baseline to 290.1 ±60.21 µm after 24 months of anti-VEGF treatment (p-value<0.001) Fig. 4. There were no significant differences in CRT changes over time between choroidal thickness groups (p-value=0.894). As expected, a negative correlation between CRT and BCVA changes was evident (r=–0.318, p-value=0.004).

IMPACT OF ANTI-VEGF TREATMENT ON VISUAL AND ANATOMIC OUTCOMES

The included eyes received a mean of 19.8 ±3.9 anti-VEGF intravitreal injections during the 24-month follow-up period. The thin, medium, and thick group received on average 17.47, 21.0 and 17.9 intravitreal injections. Two-way ANOVA analysis revealed a significant difference in the number of anti-VEGF treatments across different groups (p < 0.001). However, a subsequent post-hoc analysis failed to find a statistically significant difference in the number of treatments between thin and thick choroids (p-value =0.328).

To assess the relationship between changes in BCVA over time and the number of intravitreal injections, we used a linear mixed-effects model. This model revealed a statistically significant relationship between the number of intravitreal injections and BCVA, with an average increase of 0.541 ETDRS letters in BCVA per anti-VEGF injection (p <0.001).

No significant relationship was observed between the decrease in SFCT and the number of anti-VEGF intravitreal injections (rho=0.066, *p*-value=0.556).

CRT changes did not exhibit a significant correlation with the number of anti-VEGF intravitreal injections (rho=-0.015, *p*-value=0.893).

DISCUSSION

We report that eyes affected by nAMD consistently experience a significant BCVA improvement and SFCT reduction over a 24-month period when treated with anti-VEGF injections under a TEA regimen. We observed a more pronounced decline in SFCT during the initial 6 months of treatment. Furthermore, we observed a more substantial SFCT decrease in the baseline thick choroid group compared to their thin choroid counterparts. This observation likely reflects the complex interplay between choroidal thickness and the trophic role of VEGF, with the baseline choroidal microenvironment potentially influencing how VEGF blockage impacts vascular densities in both the deep retinal and choriocapillaris plexus.

Long-term treatment with anti-VEGF has been demonstrated to reduce the choroidal vascular index. This reduction leads to choroidal hypoperfusion and decreased vascular permeability, ultimately resulting in choroidal thinning.[7] The short and long-term effects of anti-VEGF injections on SFCT in eyes with nAMD have been extensively studied. Changes in SFCT have been evaluated at multiple time-points, including 15 days, 3 months, and 1, 2, 3, and 4 years. These evaluations consistently show significant choroidal thinning during anti-VEGF treatment at each follow-up period. Consistent with our report, this reduction was found to be more pronounced in the early stages of treatment.[13,19–23]

However, there is still a need for a better understanding of how different anti-VEGF agents impact SFCT. Treatment of nAMD with 3 monthly injections of ranibizumab followed by a pro-re-nata regimen was associated with a significant decrease in SFCT at the 12-month follow-up.[24] Nonetheless, other studies failed to find significant changes in SFCT under ranibizumab treatment.[24,25] Although conflicting data surrounds ranibizumab's impact on SFCT changes in nAMD, aflibercept has been consistently associated with choroidal thinning at different time-points to a greater extent than that observed with ranibizumab.[10] Literature data regarding bevacizumab impact in SFCT changes in nAMD eyes is scarce.

The clinical significance of choroidal thinning under anti-VEGF treatment and the potential impact of baseline SFCT and SFCT changes on anatomical and visual outcomes remains a topic of debate.

In our study, we noted a more pronounced BCVA improvement in the thin choroid group compared to a relatively modest improvement in the thick choroid group at 24 months. However, our intergroup statistical analysis did not find this difference to be significant. This limitation could be due to the relatively small sample sizes within each group, which may have reduced the statistical power of our analysis.

During the 24-month study period, we noticed different patterns in the BCVA changes between the thin and thick choroid groups. In the initial 12 months, both groups demonstrated a steady increase in BCVA, reaching comparable levels. However, the subsequent 12 to 24-month period revealed a divergence in their trajectories. The thin choroid group continued to exhibit an upward trend in BCVA, whereas the thick choroid group experienced a decline. Contrary to conventional expectations linking thin choroids with long-term macular atrophy and potential vision deterioration, our findings indicate a sustained improvement in BCVA for the thin choroid group over the long term (24 months). However, these findings should be interpreted with caution as they may be influenced by other potential confounding factors such as visual decline secondary to cataract development.

A recent study by Song *et al* found that nAMD eyes with thicker choroids at baseline showed a poorer response to three anti-VEGF injections.[26] In another study, Jhingan *et al* compared SFCT between eyes on a high-intensity anti-VEGF regimen, which could not extend treatment without a relapse, and eyes on a low-intensity anti-VEGF regimen that went into long-term remission. They concluded that thicker choroids were significant predictors of poor response.[27] These previous studies were designed to find the correlation between baseline SFCT and anatomical response in nAMD eyes treated with anti-VEGF. According to the most recent literature review, our study is the first to include nAMD patients treated with different anti-VEGF agents based on a TAE approach, designed to correlate the functional outcomes with baseline SFCT over the long term (24 months). Given that better functional responses are dependent on good anatomical outcomes, our findings may suggest that thinner baseline choroids may predict better BCVA, aligning with the findings of Song *et al* and Jhingan and colleagues. However, caution must be taken when interpreting our results, as our limited sample size may have prevented the achievement of statistically significant results. On the other hand, two previous reports by Kang *et al* and Shin *et al* showed that a thicker SFCT at baseline was associated with better anatomical and visual outcomes in eyes with nAMD treated with ranibizumab for 6 and 12 months, respectively.[14,28] Regarding the impact of choroidal thinning on anatomical and functional outcomes, there is evidence linking greater SFCT decrease to better anatomical results, defined as less persistent or recurrent retinal fluid.[13] In line with our findings, this same study failed to find a significant correlation between SFCT decrease and BCVA gains at 12-months in nAMD eyes.

Our study has several limitations that warrant consideration and are mainly attributed to its retrospective nature. TAE regimen aims to achieve the best possible visual outcomes, while reducing the number of anti-VEGF intravitreal injections and consequently the treatment burden and cost. It is currently the mainstay regimen for anti-VEGF treatment, preferred among many ophthalmologists around the world. However, a lack of retrospective and prospective clinical studies aiming to evaluate the long-term

effects of TAE in nAMD is noted. Our retrospective study reflects real-world clinical practice and included patients with a high array of baseline BCVA, treated with different anti-VEGF agents, following a TAE regimen, and comprising various treatment switches assigned according to the judgment of trained retinal specialists when incomplete or absent anatomical responses were observed. These factors prevent the analysis of the impact of each anti-VEGF agent on SFCT changes, introducing an important limitation to our study. The small sample size of each baseline choroidal thickness group was limited and may have affected the statistical power of the intergroup analysis. SFCT measurements were obtained from OCT B-scans, which were not specifically acquired using the enhanced depth imaging technique (EDI). This may impact the accuracy of SFCT measurements, as EDI-OCT is designed to provide a more accurate appreciation of choroidal thickness. SFCT values were acquired manually, which introduces the potential for measurement error. The use of automated software in future studies may enhance the precision and reproducibility of SFCT measurements. Additionally, the type of MNV was not evaluated in this cohort, introducing a potential bias, as different types of MNV may be associated with varying choroidal thicknesses and distinct visual prognoses.

CONCLUSION

In this study, we provide evidence that long-term anti-VEGF treatment in nAMD patients following a TAE regimen is linked to significant SFCT decrease and BCVA improvements. Thinner baseline choroids seem to be associated with better functional outcomes at 24 months. However, further investigations with larger sample sizes are needed to validate this data and elucidate the role of different anti-VEGF agents and treatment regimens in nAMD patients' functional outcomes. Choroidal thickness assessment may be a useful tool in tailoring treatment strategies, and future investigations may help refine personalized treatment approaches for AMD.

CONTRIBUTORSHIP STATEMENT / DECLARAÇÃO DE CONTRIBUIÇÃO

RR, AC and MF: Drafting and editing.
AFP and AM: Drafting and data collection.
All authors approved the final version to be published.

RR, AC e MF: Elaboração e redação.
AFP e AM: Redação e colheita de dados.
Todos os autores aprovaram a versão final a ser publicada.

RESPONSABILIDADES ÉTICAS

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Proteção de Pessoas e Animais: Os autores declaram que os procedimentos seguidos estavam de acordo com os regulamentos estabelecidos pela Comissão de Ética responsável e de acordo com a Declaração de Helsínquia revista em 2013 e da Associação Médica Mundial.

Proveniência e Revisão por Pares: Não comissionado; revisão externa por pares.

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Confidentiality of Data: The authors declare that they have followed the protocols of their work center on the publication of data from patients.

Protection of Human and Animal Subjects: The authors declare that the procedures followed were in accordance with the regulations of the relevant clinical research ethics committee and with those of the Code of Ethics of the World Medical Association (Declaration of Helsinki as revised in 2013).

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