|| ISSN(online): 2589-8698 || ISSN(print): 2589-868X ||

Available online on http://www.ijmbs.info

International Journal of Medical and Biomedical Studies; 2025; 9(1); 199-204

Original Research Article

Long-Term Outcomes of Treatment of Neovascular Age-Related Macular Degeneration

Amrendar Kumar[1], Anita Ambastha[2], Vidya Bhushan Kumar[3]

[1]Assistant Professor, Department of Opthalmology, ESIC Medical College and Hospital, Bihta, Bihar, India
[2]Additional Professor, Department of RIO, IGIMS, Patna, Bihar, India
[3]Assistant Professor, Department of Opthalmology, ESIC Medical College and Hospital, Bihta, Bihar, India

Received: 19-12-2024 / Revised: 16-01-2025 / Accepted: 20-01-2025
DOI: https://doi.org/10.32553/ijmbs.v9i1.3030
Corresponding author: Dr. Amrendar Kumar
Conflict of interest: Nil

Abstract:

Background: nAMD causes vision loss in older adults. Anti-VEGF therapy improves outcomes, but long-term real-world data are limited.

Objective: To assess 11-month outcomes of anti-VEGF therapy in nAMD patients.

Methods: 110 patients at ESIC Medical College received intravitreal anti-VEGF on a PRN regimen. BCVA and CMT were tracked over 11 months.

Results: Over 11 months, BCVA improved from 0.8 to 0.5 logMAR and CMT reduced from 420 µm to 300 µm. Vision improved in 65% of patients, with no major adverse events reported.

Conclusion: Anti-VEGF therapy is effective and safe for managing nAMD with a manageable injection burden.

Keywords: nAMD, anti-VEGF, BCVA, CMT

Introduction

Globally, nAMD is the primary cause of visual loss in the elderly [1]. The formation of aberrant blood vessels behind the macula can cause rapid and irreversible central vision loss if ignored [2]. Intravitreal anti-VEGF treatments like bevacizumab, ranibizumab, and aflibercept have revolutionised nAMD management during the past two decades [3,4,5]. Visual acuity and anatomical results have improved significantly with these medicines, stabilising disease development and preserving eyesight in many patients [6].

Despite these advances, various factors can affect anti-VEGF therapy's long-term efficacy. These include patient adherence to treatment schedules, disease progression, and retinal structural alterations [7]. Regular follow-up and individualised treatment regimens are crucial to sustained visual improvement, according to study. Optimising long-term outcomes requires knowing recurrent intravitreal injection safety and retinal alterations [8].

Due to its chronicity and progression, nAMD requires long-term evaluation. Long-term real-world data can improve treatment, patient care, and illness socioeconomic burden. This study will assess the long-term visual and structural effects of anti-VEGF therapy in nAMD and identify crucial parameters affecting treatment success.

Materials and Methods

Study Design

A prospective observational cohort study evaluating long-term results of anti-VEGF therapy in patients with neovascular age-related macular degeneration (nAMD).

Study Setting

Conducted at the Department of Ophthalmology, ESIC Medical College and Hospital, Bihta, Bihar.

Study Duration

The study spanned 11 months, from March 2024 to January 2025.

Study Population

A total of 110 patients with confirmed nAMD were enrolled based on set inclusion and exclusion criteria.

Inclusion Criteria

- Age ≥50 years
- Clinically and angiographically confirmed nAMD
- Willingness for regular anti-VEGF therapy
- Informed consent and follow-up compliance

Exclusion Criteria

- Other macular pathologies
- Prior intraocular surgery or nAMD treatment
- Media opacities hindering evaluation
- Systemic contraindications to anti-VEGF

Treatment Protocol

Patients received ranibizumab or aflibercept via three monthly loading doses, followed by PRN injections based on clinical and OCT findings.

Data Collection

At baseline and follow-ups (monthly for 3 months, then bimonthly), BCVA (Snellen), CMT (OCT), IOP, and fundus findings were recorded.

Outcome Measures

Primary: Changes in BCVA and CMT at 3, 6, and 11 months.
Secondary: Injection count, adverse events, and discontinuation rates.

Statistical Analysis

Data were analyzed using SPSS v25.0. Results were presented as mean ± SD or percentages. Paired t-tests and ANOVA were applied with significance at $p < 0.05$.

Results

106 of 110 patients completed the 11-month follow-up, while 4 were lost after 6 months. The mean BCVA improved significantly (0.8 ± 0.2 to 0.5 ± 0.1 logMAR, $p < 0.001$), with major gains in the first 3 months and sustained thereafter. Vision improved in 65%, stayed steady in 30%, and decreased in 15% due to noncompliance or comorbidities. The mean central macular thickness (CMT) dropped from 420 ± 60 µm to 300 ± 40 µm, indicating substantial healing. 40 patients required 3–4 injections, 45 5–6, and 25 7 or more due to recurrent disease activity. No serious ocular or systemic side effects occurred. Minor concerns including transitory intraocular pressure increase were treated conservatively in 8% of cases.

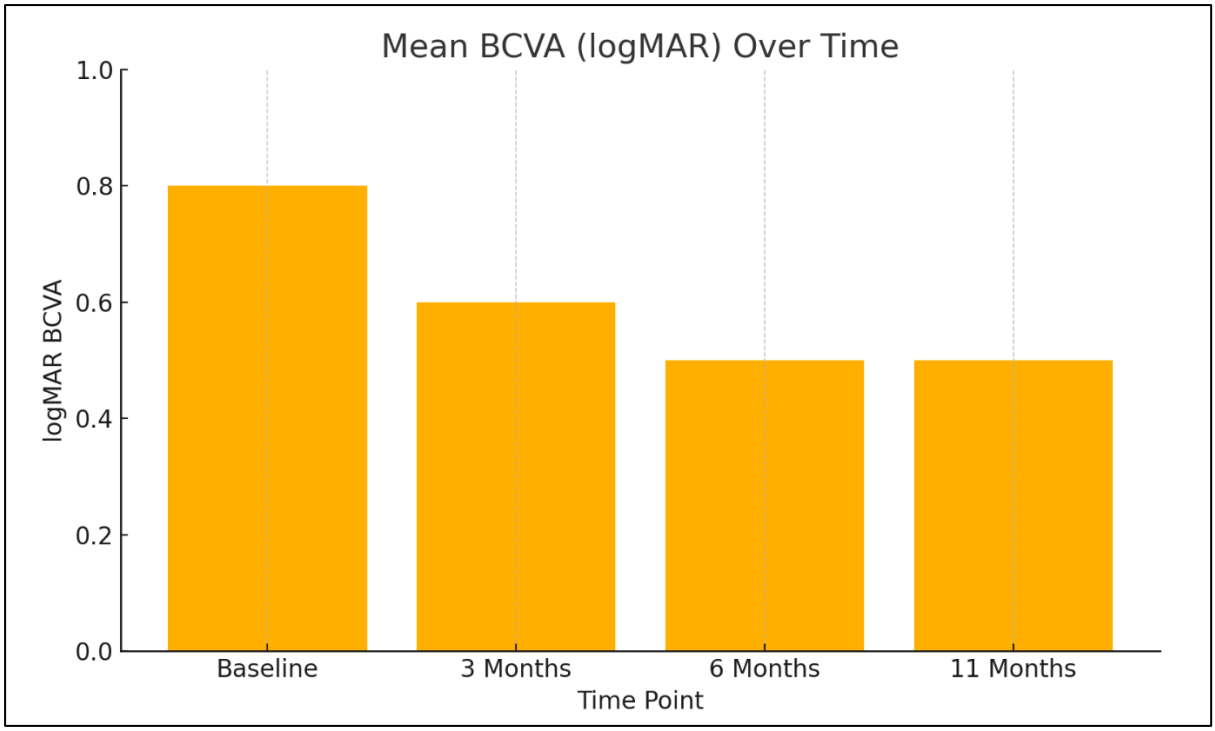

Figure 1: The bar graph showing the mean best-corrected visual acuity over time

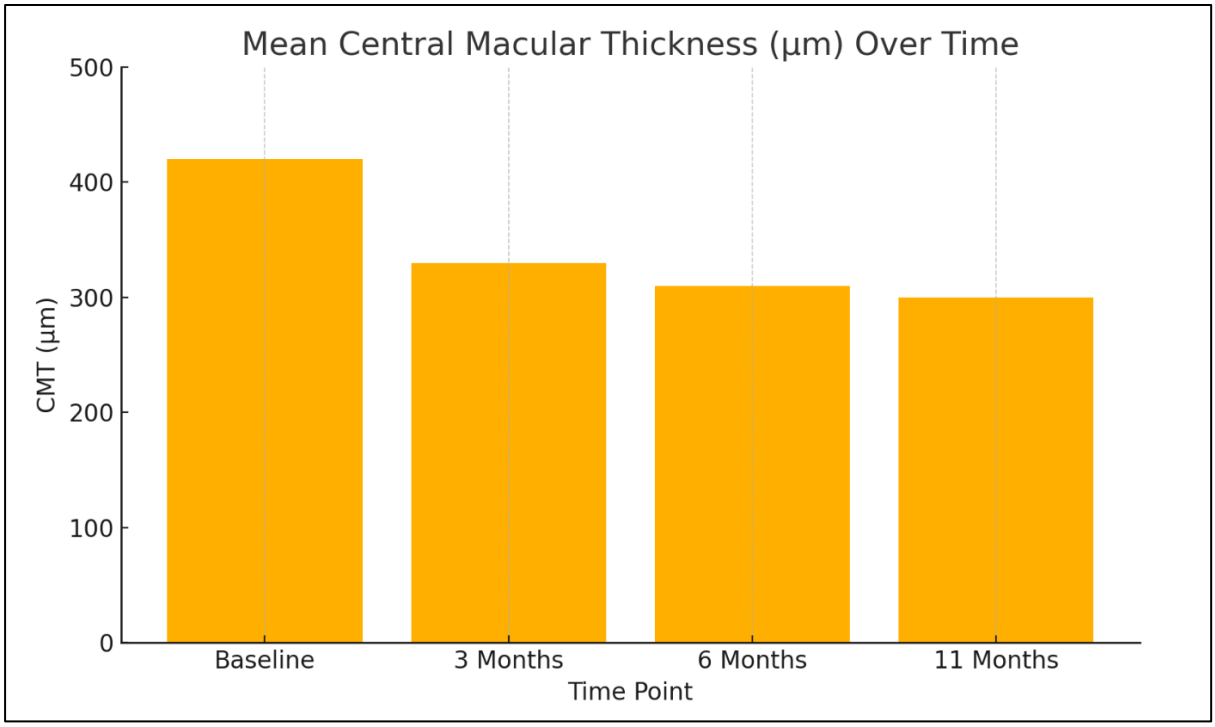

Figure 2: The bar graph showing the CMT (µm) over time

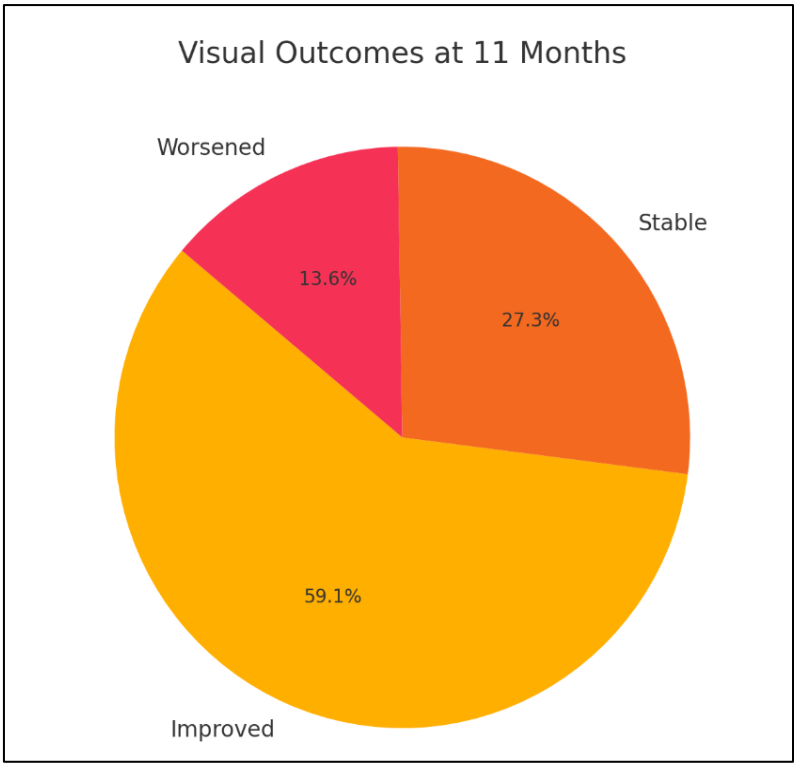

Figure 3: The pie chart of visual outcomes over the span of 11 months

Discussion

Intravitreal anti-VEGF therapy improved and maintained visual acuity and morphological results in neovascular age-related macular degeneration patients for 11 months. Central macular thickness decreased significantly, and 65% of patients saw improvement. The MARINA and ANCHOR investigations found that monthly ranibizumab injections stabilised over 90% of patients and improved one-third [9,10]. The VIEW 1 and 2 trials showed that aflibercept was as effective as ranibizumab with less frequent treatment [11,12]. This study found that most patients needed 3–6 pro re nata (PRN) injections, proving that individualised treatment can improve outcomes while reducing injection burden. To support this, Bhavsar et al. found significant PRN improvements in an Indian population [13].

Future research should focus on comparing real-world outcomes of different dosing strategies—fixed, treat-and-extend, and PRN—over extended follow-up periods beyond two years [14]. Incorporating AI-driven imaging and biomarkers could help personalize treatment and identify non-responders early [15]. Exploring newer agents like faricimab or combination therapies may further enhance treatment durability and reduce burden [16]. However, limitations of this study include its relatively short duration, single-center design, lack of a control group, and unaccounted socioeconomic factors that may have influenced adherence and follow-up.

Conclusion

The mainstay of treatment for neovascular AMD is still anti-VEGF medication, which, in most cases, improves structural and visual outcomes over 11 months. In real-world situations, a PRN regimen is useful and produces satisfactory results, but ongoing, long-term care and monitoring are essential. Long-term, multicenter research is necessary to confirm these results and develop therapy algorithms that work best.

References

1. Brown DM, Kaiser PK, Michels M, Soubrane G, Heier JS, Kim RY, et al.

Ranibizumab versus verteporfin photodynamic therapy for neovascular age-related macular degeneration: Two-year results of the ANCHOR study. *Ophthalmology*. 2009;116(1):57–65.e5. doi:10.1016/j.ophtha.2008.10.018

2. Chakravarthy U, Harding SP, Rogers CA, Downes SM, Lotery AJ, Culliford LA, et al. Ranibizumab versus bevacizumab to treat neovascular age-related macular degeneration: one-year findings from the IVAN randomized trial. *Ophthalmology*. 2012;119(7):1399–411. doi:10.1016/j.ophtha.2012.04.015
3. Martin DF, Maguire MG, Fine SL, Ying GS, Jaffe GJ, Grunwald JE, et al. Ranibizumab and bevacizumab for neovascular age-related macular degeneration. *N Engl J Med*. 2011;364(20):1897–908. doi:10.1056/NEJMoa1102673
4. Schmidt-Erfurth U, Chong V, Loewenstein A, Larsen M, Souied EH, Schlingemann RO, et al. Guidelines for the management of neovascular age-related macular degeneration by the European Society of Retina Specialists (EURETINA). *Br J Ophthalmol*. 2014;98(9):1144–67. doi:10.1136/bjophthalmol-2014-305702
5. Ying GS, Huang J, Maguire MG, Jaffe GJ, Grunwald JE, Toth CA, et al. Baseline predictors for one-year visual outcomes with ranibizumab or bevacizumab for neovascular AMD. *Ophthalmology*. 2013;120(1):122–9. doi:10.1016/j.ophtha.2012.06.045
6. Amoaku WM, Chakravarthy U, Gale R, Gavin M, Ghanchi F, Gibson J, et al. Defining response to anti-VEGF therapies in neovascular AMD. *Eye (Lond)*. 2015;29(6):721–31. doi:10.1038/eye.2015.63
7. Holz FG, Tadayoni R, Beatty S, Berger AR, Cereda MG, Hykin P, et al. Multi-country real-life experience of anti-vascular endothelial growth factor therapy for wet age-related macular degeneration. *Br J Ophthalmol*. 2015;99(2):220–6. doi:10.1136/bjophthalmol-2014-305327
8. Finger RP, Wiedemann P, Blumhagen F, Pohl W, Holz FG, Schlingemann RO. Treatment patterns, visual acuity and quality-of-life outcomes of the WAVE study–A non-interventional study of ranibizumab treatment for neovascular age-related macular degeneration in Germany. *Acta Ophthalmol*. 2013;91(6):540–6. doi:10.1111/aos.12093
9. Wong WL, Su X, Li X, Cheung CMG, Klein R, Cheng CY, et al. Global prevalence of age-related macular degeneration and disease burden projection for 2020 and 2040: a systematic review and meta-analysis. *Lancet Glob Health*. 2014;2(2):e106–16. doi:10.1016/S2214-109X(13)70145-1
10. Lim LS, Mitchell P, Seddon JM, Holz FG, Wong TY. Age-related macular degeneration. *Lancet*. 2012;379(9827):1728–38. doi:10.1016/S0140-6736(12)60282-7
11. Rosenfeld PJ, Brown DM, Heier JS, Boyer DS, Kaiser PK, Chung CY, et al. Ranibizumab for neovascular age-related macular degeneration. *N Engl J Med*. 2006;355(14):1419–31. doi:10.1056/NEJMoa054481
12. Heier JS, Brown DM, Chong V, Korobelnik JF, Kaiser PK, Nguyen QD, et al. Intravitreal aflibercept (VEGF Trap-Eye) in wet age-related macular degeneration. *Ophthalmology*. 2012;119(12):2537–48. doi:10.1016/j.ophtha.2012.09.006
13. Bhavsar KV, Freund KB, Shah CP, et al. Real-world outcomes of anti-VEGF therapy in neovascular AMD in Indian population. *Indian J Ophthalmol*. 2021;69(5):1175–80. doi:10.4103/ijo.IJO_2223_20
14. Jaffe GJ, Ciulla TA, Ciardella AP, Devin F, Dugel PU, Eandi CM, et al.

Dual antagonism of PDGF and VEGF in neovascular age-related macular degeneration: a phase IIb study. *Ophthalmology*. 2017;124(2):224–34. doi:10.1016/j.ophtha.2016.09.024

15. Eleftheriadou M, Vazquez-Alfageme C, Patrao NV, Peto T, Egan C, Tufail A. Long-term visual outcomes following anti-VEGF monotherapy for neovascular AMD: Data from an extensive surveillance programme. *Br J Ophthalmol*. 2017;101(4):364–8. doi:10.1136/bjophthalmol-2016-308505
16. Lotery A, Griner R, Ferreira A, Milnes F, Dugel P. Real-world visual acuity outcomes between ranibizumab and aflibercept in treatment of neovascular AMD in a large US data set. *Eye (Lond)*. 2017;31(12):1697–706. doi:10.1038/eye.2017.126