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Research Article

Correlation Between Visual Acuity and Macular Thickness in the Treatment of Diabetic Macular Edema with Anti-VEGF Therapy

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ABSTRACT

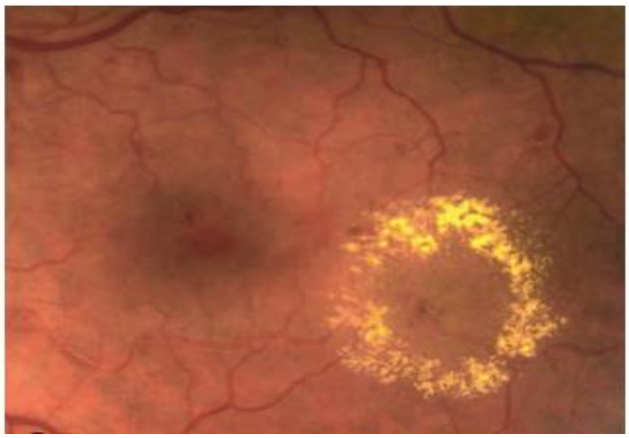
Background: Diabetic macular edema (DME) is one of the leading causes of central vision loss in diabetic patients. Anti-VEGF therapy, particularly intravitreal Bevacizumab, is widely used to reduce macular edema and improve visual outcomes.
Aim: To evaluate the correlation between visual acuity (VA) and central macular thickness (CMT) in patients with DME treated with intravitreal anti-VEGF therapy.
Methods: This hospital-based cross-sectional study was conducted in the Department of Ophthalmology, Assam Medical College, Dibrugarh, from June 2023 to May 2024. A total of 120 patients with DME, aged 25–75 years, received intravitreal Bevacizumab (1.25 mg/0.05 ml). Best corrected visual acuity (BCVA) and CMT (measured by OCT Topcon 3D OCT) were recorded one week prior and one month after treatment. Data were analyzed using SPSS version 25, and statistical correlation was assessed using ANOVA.
Results: Among the 120 patients (72 males, 48 females; mean age 49.8 ± 6.7 years), the mean duration of diabetes was 10.15 ± 3.21 years. The mean baseline CMT was 384.38 ± 40.51 µm, which reduced to 323.19 ± 32.58 µm after one month of therapy. A total of 61 patients (50.8%) achieved a mean BCVA of 0.5 logMAR at one month. A statistically significant correlation was observed between post-treatment CMT reduction and improvement in VA ($p < 0.05$).
Conclusion: Intravitreal Bevacizumab significantly reduces central macular thickness and improves visual acuity in patients with DME. The strong correlation between CMT reduction and VA improvement highlights the effectiveness of anti-VEGF therapy as a primary treatment option for DME.

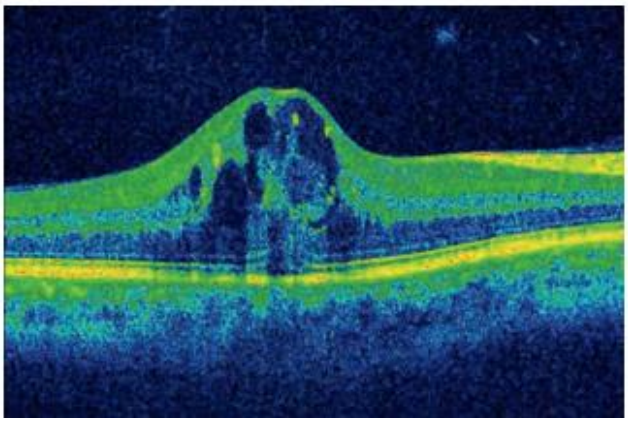
Keywords*: Diabetic macular edema, Visual acuity, Central macular thickness, Anti-VEGF therapy, Bevacizumab*

INTRODUCTION

- Diabetic macular edema is one of the major causes of loss of central vision in diabetic patients.[1]
- Anti-VEGF treatment is considered as an adjunctive treatment for DME.[1]
- Bevacizumab is a full-length antibody that inhibits all isoforms of the VEGF-A family.[1]

OCT central macular thickness (CMT), in conjunction with VA is often used to guide decision-making in determining the treatment frequency for patients with DME.[2]





AIMS AND OBJECTIVE

- To determine the correlation between visual acuity and macular thickness in the treatment of Diabetic Macular Edema with Anti-VEGF therapy.

MATERIALS AND METHODS

- **TYPE OF STUDY :** Hospital based cross-sectional study.
- **SAMPLE SIZE** : 120 patients of the Diabetic Macular Edema (DME) receiving anti-VEGF treatment that reported with both VA and CMT 1 week before and 1 month after treatment.
- **DURATION OF STUDY**: 1 year from June 01, 2023 to May 31, 2024.
- **PLACE OF STUDY** : Department of Ophthalmology, Assam Medical College, Dibrugarh.

MATERIALS AND METHODS

INCLUSION CRITERIA:

- 120 patients of either gender, age between 25 to 75 years with any type, duration of diabetes mellitus and having diabetic macular edema.
- Intravitreal anti-VEGF injection as the primary intervention.
- Patients with sufficient data and informed consent.

EXCLUSION CRITERIA:

- Participants with coexisting ocular conditions, such as age-related macular degeneration, proliferative diabetic retinopathy, retinal vein occlusion, active ocular infection.
- Patients having bleeding disorder, recent myocardial infarction, uncontrolled hypertension, pregnancy and previous history of focal or grid laser.

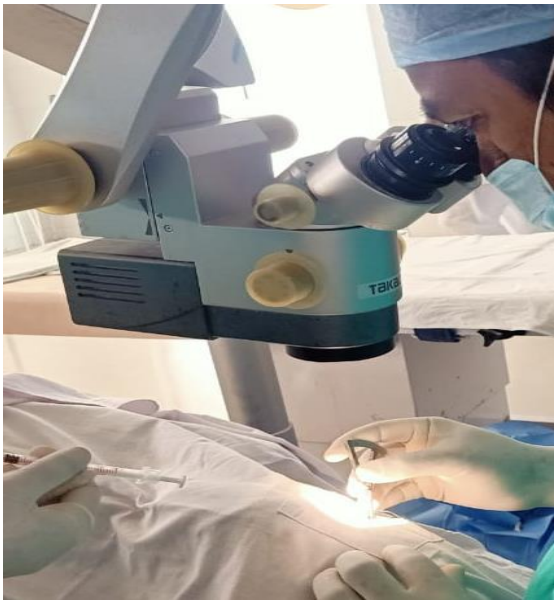
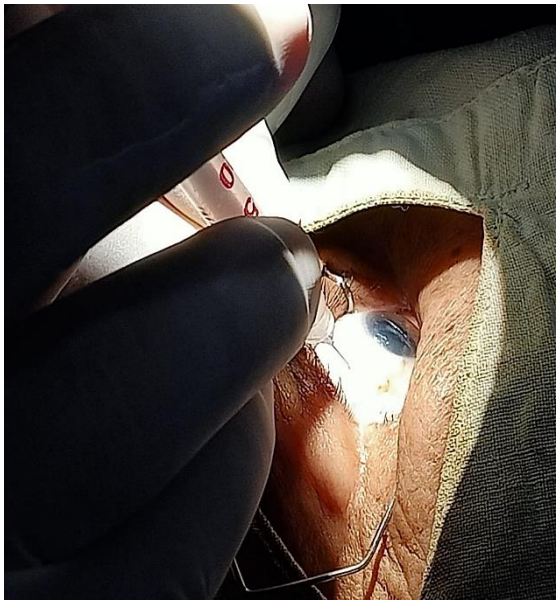
History of previous intravitreal therapy or retinal surgery.

METHODOLOGY:

- Detailed history of the participants including onset and duration of diabetes were taken.
- Complete ophthalmological examination with fundoscopic evaluation was done using Direct and Indirect Ophthalmoscope.
- OCT was done on Topcon 3D OCT (in depth resolution- 6μ) one week prior to procedure to assess the macular thickness.
- Under all aseptic and antiseptic condition, intravitreal injection of 1.25 mg/0.05ml of Bevacizumab (Avastin) was injected 3.5-4mm from limbus under topical anaesthesia.
- Follow up was scheduled on 1st post procedure day and after one month, BCVA of the patients were noted.
- OCT was done 1 month after the injection and changes in macular thickness were noted.

Data was analysed using SPSS version 25.



RESULTS AND OBSERVATION

- Out of the 120 Patients, 72 were males and 48 were females. Age of patients ranged from 29 to 71 years.
- The mean duration of diabetes was 10.15 years ± 3.21 years.
- Out of 120 patients, 61 patients (50.8%) showed mean BCVA of 0.5 (logMAR chart) after one month of Intravitreal Avastin injection.
- Mean Pre Avastin macular thickness was 384.38 ± 40.51 µm and post Avastin after one month was of 323.19±32.58 µm.

Table 1: Distribution of grade of Diabetic Retinopathy among the patients studied.

Grade of DR with macular edema	Frequency	Percentage
Mild NPDR	26	21.7
Moderate NPDR	42	35
Severe NPDR	52	43.3
Total	120	100

Table 2 : Reduction in Macular thickness following single intravitreal injection of Avastin at one month follow up.

Reduction in macular thickness	Frequency	Percentage
Yes > 10%	89	74.2
Yes < 10%	31	25.8
Total	120	100

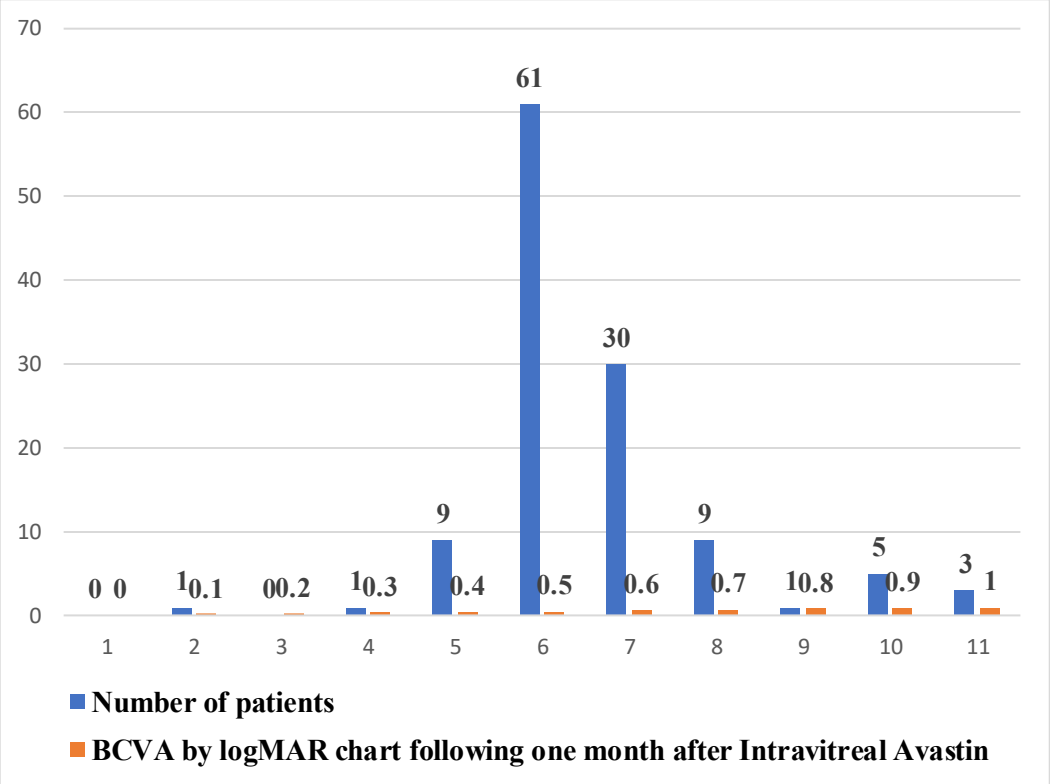


Fig.1: Clustered column chart showing BCVA (logMAR chart) against number of patients studied one month after Intravitreal Avastin.

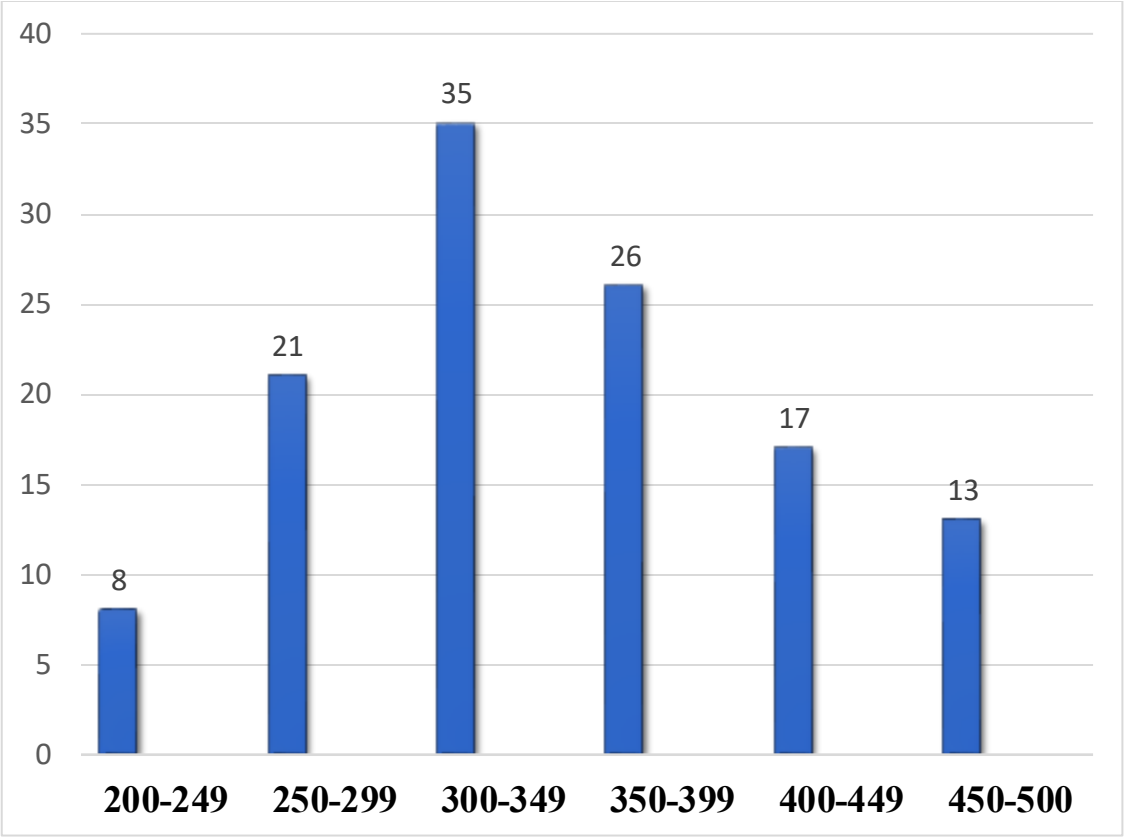


Fig.2 : Bar diagram showing central macular thickness against number of patients studied after one month of Intravitreal Avastin.

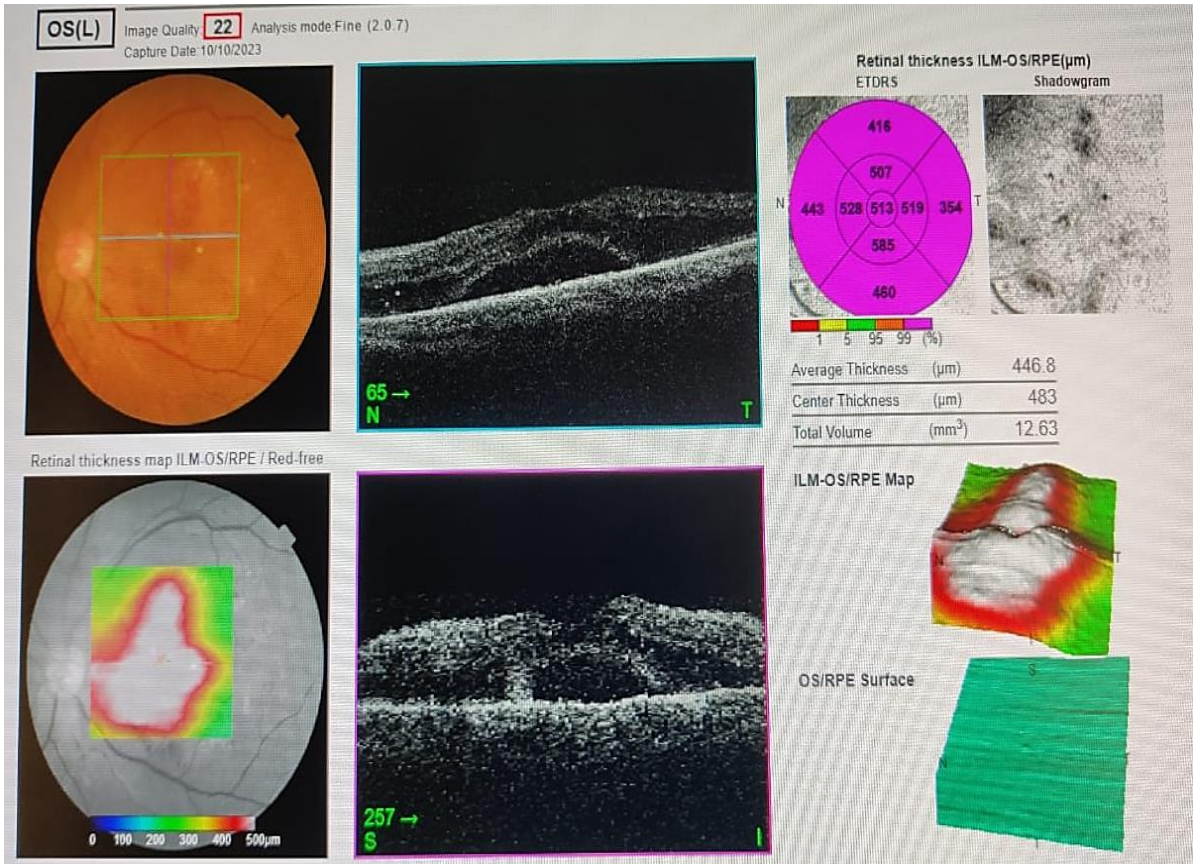


Fig. 4: Pre-Avastin OCT image.

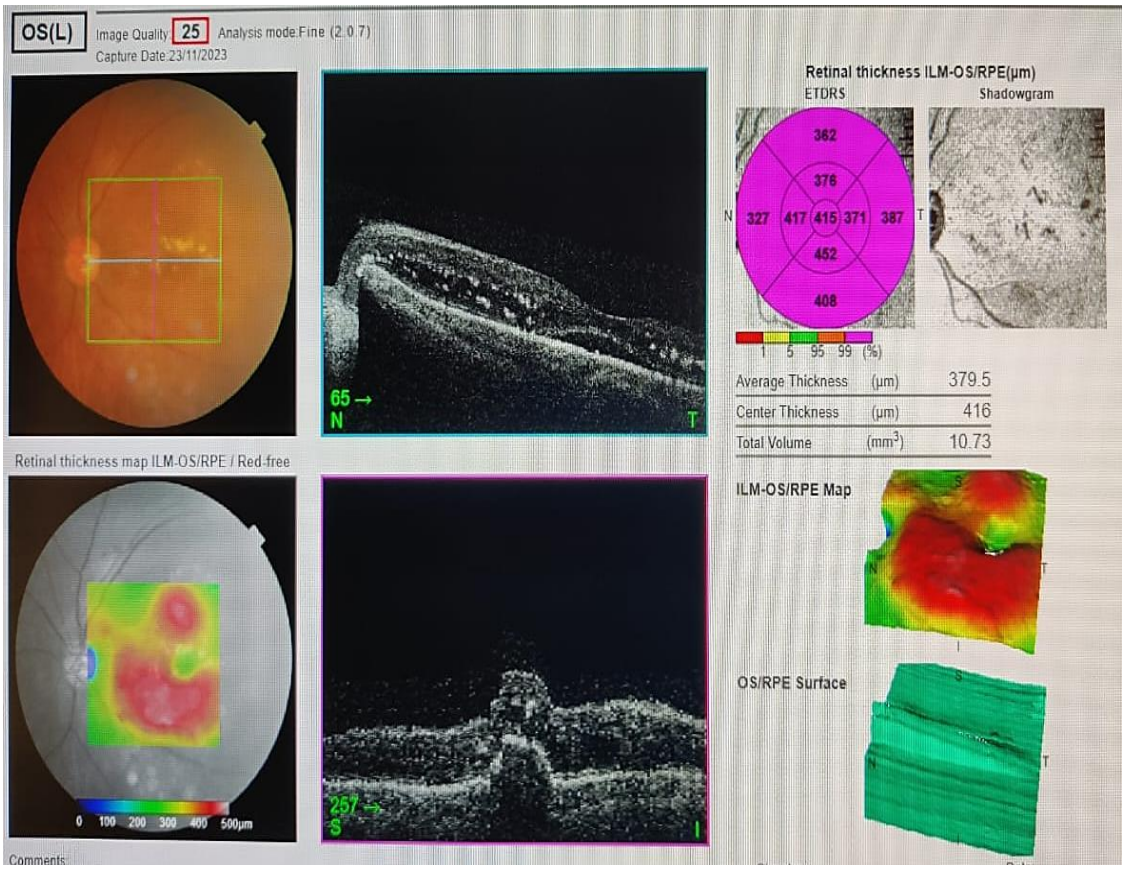


Fig. 5: Post-Avastin OCT image.

DISCUSSION

- A total of 120 patients were selected for this study and most of the patients were in their fifth decade.
- Poor financial background of the patients could be attributed to their poor diabetic control and lesser compliance towards follow up.
- We focused specifically on the correlation of VA with change in CMT and found significant relationship between the two.
- In a retrospective study by **J. Fernando Arevalo et al,** he found that primary intravitreal bevacizumab at doses of 1.25 to 2.5 mg seem to provide stability or improvement in VA, OCT, and FA in DME at 6 months.[3]

In a study by **Gabriel Willmann et al**, DME eyes show significantly lower foveal thickness than matched controls after DME resolution achieved with one-year anti-VEGF therapy.[6]

CONCLUSION

- In our study, mean pre Avastin macular thickness was 384.38 ± 40.51 micrometers and post Avastin mean macular thickness after one month was 323.19±32.58 micrometers.
- Macular thickness after one month of injection was decreased to >10% in 89 patients and <10% in 31 patients.
- 61 out of 120 patients (50.8%) showed mean BCVA of 0.5 (logMAR chart) after one month of Intravitreal Avastin injection.
- In our analysis, we have seen that there is significant improvement in macular thickness and VA following one dose of Intravitreal Avastin (statistically significant relationship between logMAR VA and CMT post intravitreal Avastin; $p < 0.05$, calculated by ANOVA).

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