MEDICAL SCHOOL
UNIVERSITY OF MICHIGAN

Capstone for Impact Submission | GY2019

Project Title: Impaired Visual Function and Mid-peripheral Retinal Non-Perfusion in Diabetic Macular Edema: A Baseline Study.

Student Name(s): Omari, Amro

Advisor Names(s): Cliff Craig

Branch: Procedure Based Care

Path of Excellence:

Handover/Transition:
If this project can be continued by another UMMS student, you may contact them at the following email address/phone number (N/A if project cannot be handed over): **N/A**

Summary:

Diabetic macular edema (DME) is the most common cause of vision loss in diabetic retinopathy. Previous approaches to understanding DME have focused on the macula, so the role of the mid-peripheral retina is an important knowledge gap. The aim of the study is to determine whether the severity of midperipheral retinal non-perfusion is associated with worse visual function in those with DME.

The study was conducted at Kellogg Eye Center. The study adhered according to the tenets of the declaration of Helsinki, and received IRB approval from the University of Michigan Medical School. DME patients and controls were recruited from Kellogg Eye Center's retinal clinics. Twenty-three treatment naive patients with DME and 20 age matched controls from Kellogg Eye Center's retina clinics had extensive visual function testing which included visual acuity measurement, visual fields using the frequency doubling perimetry (FDP), Octopus standard automated perimetry and kinetic perimetry methods, microperimetry using the Macular Integrity Assessment (MAIA), contrast sensitivity testing using the Quick Contrast Sensitivity Function (QCSF), and multifocal ERG (mfERG). Subjects also had ultra-wide field fluorescein angiograms and the non-perfusion in the macula, mid periphery, and entire retina were calculated using a machine-quantified algorithm. Performance on each visual function parameter was compared between diabetic and non-diabetic subjects using t tests with Bonferroni correction, and was correlated with mid-peripheral non-perfusion using Pearson correlations.

The study showed that patients with DME had a worse visual acuity than non-diabetic controls and had reduced sensitivity on the FDP, QCSF, MAIA, mfERG, and Octopus static and kinetic perimetry at $p< 0.05$. Although not statistically significant, Mid-peripheral non-perfusion correlated with worse visual functioning in subjects with DME irrespective of the central macular thickness or macular volume on spectral domain OCT.

Overall, we can conclude that patients with DME have a severe burden of central and peripheral visual dysfunction that is more sensitively revealed than visual acuity or OCT findings alone. These findings may provide better means to predict prognosis and response to treatment.

Methodology:

Twenty-three treatment naive patients with DME and 20 age matched controls from Kellogg Eye Center's retina clinics had extensive visual function testing which included visual acuity measurement, visual fields using the frequency doubling perimetry (FDP), Octopus standard automated perimetry and kinetic perimetry methods, microperimetry using the Macular Integrity Assessment (MAIA), contrast sensitivity testing using the Quick Contrast Sensitivity Function (QCSF), and multifocal ERG (mfERG). Subjects also had ultra-wide field fluorescein angiograms and the non-perfusion in the macula, mid periphery, and entire retina were calculated using a machine-quantified algorithm. Performance on each visual function parameter was compared between diabetic and non-diabetic subjects using t tests with Bonferroni correction, and was correlated with mid-peripheral non-perfusion using Pearson correlations.

Results/Conclusion:

Patients with DME have a severe burden of central and peripheral visual dysfunction that is more sensitively revealed than visual acuity or OCT findings alone. These findings may provide better means to predict prognosis and response to treatment.

Reflection/Lessons Learned:

The study really exposed me to the research process, and the immense amount of work involved in conducting clinical studies. I was involved in applying for funding, IRB applications, patient scheduling and testing, and writing the manuscript. It was a good experience that will help me when I try to publish in residency and beyond.