**Shining a spotlight on diabetic retinal detachment**

**Diabetic complications**

One complication of DM is diabetic retinopathy (DR), which is a leading cause of sight loss in the working-age population in the West. Particularly at risk are long-time diabetics with poor control of their blood sugar and poor blood pressure control—prevalent in patients with insulin-dependent diabetes. Dr Miguel A Quiroz Reyes, MD, and collaborators at the Retina Specialist Unit at Oftalmologia Integral ABC, Mexico, set out to better understand the outcomes of patients with severe eye complications as a result of diabetes.

DR can be categorised into two main types. Non-proliferative diabetic retinopathy is the early-stage of the disease and is less serious. It is defined by early intra-retinal microvascular findings associated with structural damage to the blood vessels. Symptoms can be mild or even non-existent at this stage. For long-term diabetics, DR can become progressive and is known as proliferative diabetic retinopathy (PDR). More serious than DR, PDR is characterised by growth of new blood vessels that pose a risk for vitreous bleeding, retinal detachment, and neovascular glaucoma.

As Dr Quiroz-Reyes explains, “PDR can lead to further complications of recurrent vitreous haemorrhages (VR), tractional retinal detachment (TRD), refractory macular edema associated with posterior hyaloid traction, combined traction/rhegmatogenous retinal detachment, and epiretinal membrane (ERM) proliferation.” In addition to PDR-related changes, other known causes of visual loss in DM include diabetic macular edema (DME) and chronic cystic macular edema (CME).

Typical treatments for long-term DR complications involve surgical vitrectomy—eye surgery that specifically treats problems with the retina and vitreous. Here, the pathological vitreous humour of the eye is removed to enable better access to the retina. In patients where clinical detection of retinopathy has been delayed, advanced pars plana vitrectomy (PPV) surgery (which removes the vitreous to enable access to the back of the eye) has proven useful. According to Dr Quiroz-Reyes, however, “We don’t yet know enough about the visual outcomes for the patients treated.”

**We don’t yet know enough about the visual outcomes for diabetic patients.**

Recent research has shown that the problem of restricted blood flow, together with enlargement in the region of the macular known as the FAZ with decrease in the blood flow to the macular region has since been detected in several retinal vascular diseases: diabetic retinopathy (DR), hypertensive retinopathy, retinal vein occlusion, and sickle cell disease.

**Newer techniques**

In the early 1990s a new and complementary technique to FA, optical coherence tomography (OCT), arrived on the scene. This non-contact and non-invasive method completely revolutionised ophthalmological research. Today, this tool facilitates the visualisation of the front (antero-s) and back (postero-s) segments of the eye and can be used to generate 3D models of the retina. It can be performed each time a patient visits the clinic.

More recently, a technique known as optical coherence tomography angiography (OCT-A) has also emerged. A non-invasive method for visualising the blood supply to the retina, it does not require the injection of dye. OCT-A is used to assess the density of blood vessels and to quantify blood flow.
behind the research
Professor Miguel A Quiroz Reyes

Our study demonstrates that diabetic ischaemia is largely responsible for poor visual outcomes.

Flow to the eye. It has been shown to be a crucial tool for assessment of age-related macular degeneration (AMD) and DR.

This method can also be used to accurately detect a range of other clinically important changes to the eye, including neovascularization (new blood vessel growth), retinal branch vein occlusion (BRVO), retinal artery occlusion (RAO), vessel abnormalities, non-perfused areas of the different subregions of the retina, and anterior segment neovascularisation.

Investigating Diabetic Macula-Off Tractional Retinal Detachment

Using OCT-A, Dr Quiroz-Reyes specifically investigated diabetic macula-off tractional retinal detachment. This condition occurs in long-term diabetics who experience complications of PDR and are thereby at risk of sight loss.

Dr Quiroz-Reyes set out to investigate post-surgical outcomes for visual acuity in those who had successfully undergone up-to-date perfusion-control PPV for tractional retinal detachment. Using this multi-modal imaging tool, Dr Quiroz-Reyes obtained detailed images deep into the retinal tissues including the vasculature. During follow-up, perfusional, structural, and functional post-surgical outcomes were assessed, and compared to fully resolved TRD. The study included a total number of 30 eyes in 27 patients.

The serial post-operative OCT-A imaging highlighted abnormal microcirculation patterns, both at the superficial level and in deep vascular areas. Multiple micro-abnormalities typical of FAZ were observed, capillary dropouts with an irregular and enlarged perifoveal capillary network, and different but distinct areas of non-perfused macula regions according to the flow deficiencies in macular blood flow were evaluated. There was evidence of disorderisation of the retinal inner layers (DRIL) and chronic ischaemic macular edema in 82% of the cases examined—an outcome which explains the levels of poor visual recovery seen with this condition.

As Dr Quiroz-Reyes says: ‘our study demonstrates that diabetic ischaemia is largely responsible for poor visual outcomes. Technology has improved over the past decade, improving the surgical treatment of retinal detachment involving the macula. However, the outcomes of surgical treatments for diabetic patients have not undergone a similar change.’

This study expands our understanding of OCT-A for detailed imaging and the presence of DRIL in successful cases of surgical treatment of the eye. Further research is now needed to determine the optimum time for surgical intervention in patients with TRD threatening or involving the macular region.

Research Objectives

Professor Miguel A Quiroz-Reyes, MD, investigates the long-term post-operative outcomes in the sight-threatening condition, diabetic macula-off tractional retinal detachment.

Detail

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Bio

Miguel A Quiroz-Reyes, MD was born in Mexico City. He did his postgraduate studies at the National Autonomous University of Mexico, Institute of Ophthalmology, Eye Research Schepens Foundation, Massachusetts Eye and Ear Infirmary, and Retina Associates, Boston, MA, USA. He is former president of The Mexican Retina Society, and retina surgeon at the Institute of Ophthalmology and Retina Specialist Unit at Oftalmologia Integral ABC Institution, a medical and surgical non-profit organisation.

Funding

Retina Specialists Unit at Oftalmologia Integral ABC

Collaborators

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References


Personal Response

Do the current imaging modalities available enable ophthalmologists to entirely visualise the vasculature of the eye?

Recently, OCT-A has particularly evolved in favour of the study of patients with ocular vascular alterations caused by a wide variety of mainly systemic diseases with secondary repercussion at the retinalochoroidal level. From spectral domain OCT angiography we have gone to Swept Source OCT angiography with greater definition, field of visualisation, and better penetration at the tissue level—allowing us to assess practically all the vascular layers of the eye at the same time. Even the deepest vascular layers of the eye can be visualised with this new non-invasive imaging technology. Consequently, we are better prepared to diagnose in a timely manner and treat serious retinal vascular entities, such as diabetic retinopathy, that potentially cause blindness.