Commentary: Retinal and choroidal vascular changes in newly diagnosed celiac disease: An optical coherence tomography angiography study - Are we going overboard?

The use and utility of optical coherence tomography angiography (OCTA) imaging for detection of occult retinal lesions and clinical confirmation of suspected retinal vascular pathologies are picking up pace in our daily clinical practice. Its noninvasive nature, ability to attain en face imaging for different retinal vascular strata, and the ability to demonstrate volumetric change in vascular structure/vascular flow in tandem with retinal ultrastructural changes have proved further understanding in primary retinochoroidal diseases such as myopia, vein occlusions, diabetic retinopathy, glaucoma, age-related macular degeneration, and macular telangiectasia.[1]

OCTA has also helped to elucidate secondary retinal involvement, evidenced by alterations in retinal vascular density, choroidal thickness, and choroidal vascularity indexes in systemic conditions encompassing acute coronary syndrome, pregnancy, sepsis, Takayasu arteritis, leukemia, celiac disease, and bariatric surgery.[2-6]

Understanding the potential ability of software augmented digital imaging techniques to detect, quantify, and compare occult retinal vascular changes as an indirect representation of systemic disease activity has come as a speculated hope for disease activity detection and monitoring. Clinicians have been attempting to extend its use for detection and monitoring ongoing systemic disease activity, as a function of vascular alterations demonstrated on angio imaging of the retina.

Because OCTA can recognize changes in vascular structure as well as vascular density for different retinal/choroidal strata, it remains essential to understand the factorials that drive the angioflow alterations. The subtle vascular changes evidenced on angio imaging are a representation of hyperglobulinemia-related evolving compensatory homeostatic alterations of retinal microcirculation in chronic diseases and hence are not specific to any one particular etiology.[3]

Because the macula remains the most perfused part of the retina with a relatively higher vascular density compared to its neighboring regions, the higher density of vessels reflects the higher metabolic demand of this region, because of which alterations following any form of angiopathic stress have been best demonstrated in this region.[3] It is because of this that most of the OCTA-based studies have studied perfusion alterations at and around the macular region. Additionally, the small field of the conventional field angio imaging system limits the field of examination, best imaged around the central 9 mm surrounding the fovea.

Care must be taken while conducting and during interpretation of OCTA studies as the retinal vascular density-related angio flow changes are influenced by age and gender differences, presence of cilio-retinal artery, diurnal variation, retinal autoregulatory mechanism, and vascular stasis due to rheological parameters such as viscosity or endothelial injury. Furthermore, associated nutritional deficiency, anemia, background diabetes, hypertension, and chronicity of disease also tend to be responsible for vascular alterations.[1,7-9]

In context to celiac disease, a gluten-related autoimmune enteropathy, the ocular involvement has been speculated to be related to the cornerstone events of autoimmunity and malabsorption. The intestinal changes secondary to inflammation are responsible for malabsorption and deficiency of micronutrients such as iron, vitamin B 12, folic acid, and calcium. The associated autoimmunity has been linked to endothelial dysfunction and hyperglobulinemia-related rheological changes. Angio imaging studies of the maculae in patients with celiac disease have reported decreased capillary density in the superficial and deep capillary plexus of the retina with an associated increase/decrease in choroidal thickness;[6,9] however, the choroidal vascularity index remains unchanged.

The retinal vascular destiny can be altered due to a multitude of physiological and pathological causes, which disrupts the sensitivity and specificity of angio imaging as a tool for the determination of disease activity of primarily systemic diseases. The other practical challenges with its application include predilection for artifacts, good patient cooperation, the requirement of media clarity, lack of normative database to allow comparison, and the need for third-party software for vascular density estimation.

Although OCTA provides a great opportunity to visualize the retinal vascular changes in a variety of systemic diseases, its usefulness as a clinical tool to screen, monitor, and predict outcomes for systemic diseases remains uncertain.

Alok Sen[1], Gaurav M Kohli[1,2]

[1]Department of Vitreo-Retina and Uveitis, Shri Sadguru Seva Sangh Trust, Sadguru Netra Chikitsalaya, Chitrakoot, Madhya Pradesh, [2]Department of Ophthalmology, Hind Institute of Medical Sciences, Sitapur, Uttar Pradesh, India

Correspondence to: Dr. Alok Sen, Shri Sadguru Seva Sangh Trust, Sadguru Netra Chikitsalaya, Chitrakoot - 210 204, Madhya Pradesh, India.
E-mail: draloksen@gmail.com

References

1. de Carlo TE, Romano A, Waheed NK, Duker JS. A review of optical coherence tomography angiography (OCTA). Int J Retina Vitreous 2015;1:5.
2. Regar E, van Soest G, Bruining N, Constantinescu AA, van Geuns RJ, van der Giessen W, *et al*. Optical coherence tomography in patients with acute coronary syndrome. EuroIntervention 2010;6(Suppl G):G154-60.
3. Courtie E, Veenith T, Logan A, Denniston AK, Blanch RJ. Retinal blood flow in critical illness and systemic disease: A review. Ann Intensive Care 2020;10:152.
4. Chanwimol K, Balasubramanian S, Nassisi M, Gaw SL, Janzen C, Sarraf D, *et al*. Retinal vascular changes during pregnancy detected with optical coherence tomography angiography. Invest Ophthalmol Vis Sci 2019;60:2726-32.
5. Chotard G, Diwo E, Coscas F, Butel N, Saadoun D, Bodaghi B. Fluorescein and OCT angiography features of Takayasu disease. Ocul Immunol Inflamm 2019;27:774-80.
6. Erdem S, Ucmak F, Karahan M, Ava S, Dursun M, Dursun B, *et al*. Evaluation of retinal microvascular perfusion changes in patients with celiac disease. Ocul Immunol Inflamm 2021:1-7.
7. Diener R, Leclaire MD, Eckardt F, Lauermann JL, Alnawaiseh M, Eter N, *et al*. Cilioretinal arteries influence optic nerve head, peripapillary, and macular vessel densities in healthy eyes: An optical coherence tomography angiography study. Retina 2021;41:2399-406.
8. Chawla R, Pujari A, Markan A, Shah P, Kumar S, Hasan N, *et al*. Age-related changes in macular vessels and their perfusion densities on optical coherence tomography angiography. Indian J Ophthalmol 2020;68:494-9.
9. Gumus M, Eker S, Karakucuk Y, Ergani AC, Emiroglu HH. Retinal and choroidal vascular changes in newly diagnosed celiac disease: An optical coherence tomography angiography study. Indian J Ophthalmol 2022;70:866-71.

Access this article online

Quick Response Code:

Website: www.ijo.in

DOI: 10.4103/ijo.IJO_2825_21

Cite this article as: Sen A, Kohli GM. Commentary: Retinal and choroidal vascular changes in newly diagnosed celiac disease: An optical coherence tomography angiography study - Are we going overboard?. Indian J Ophthalmol 2022;70:871-2.