Acta Scientific Ophthalmology (ASOP)
ISSN: 2582-3191
DOI:

Short Communication

Special Issue 1- 2021

Newly Introduced OCT Findings Important in the Evaluation of Vitreomacular Traction (VMT)

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Received: April 24, 2021
Published: April 30, 2021
ISSN: 2582-3191

Assessment of the vitreoretinal interface has been greatly aided by the development of optical coherence tomography (OCT) [1,2].

The vitreomacular traction syndrome is a complication of partial PVD where the vitreous is separated from the retina throughout the peripheral fundus, but remains adherent in a broad, often dumbbell shaped region encompassing the macular area and optic nerve [3,4]. Two biomarkers were relatively recently introduced in the literature for the early recognition of vitreoretinal interface abnormalities.

Cotton ball sign

Optical coherence tomography (OCT) has shown that a vertical or tangential traction on the retina causes wrinkling of the internal limiting membrane, flattening of the foveal pit and intraretinal cystic changes [5]. Moreover, recent spectral-domain (SD) OCT has shown that eyes with VMT and ERM have structural abnormalities of the photoreceptors at the fovea, for example, loss of the photoreceptor inner/outer segment (IS/OS) junction line [6,7]. The abnormalities in the IS/OS junction line were correlated significantly with poorer visual function; however, the relationship between these abnormal OCT findings and the foveal traction has not been determined definitively. The SD OCT studies have shown a roundish or diffuse highly reflective region at the center of the fovea in all of the cases of VMT and in cases of ERM with increased central foveal thickness (CFT). This OCT finding was termed the cotton ball sign [8].

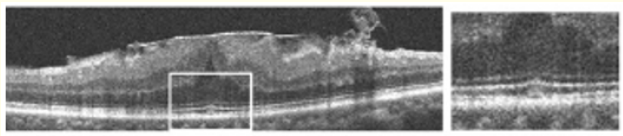

Figure 1: Cotton ball sign associated with tangential traction [8].

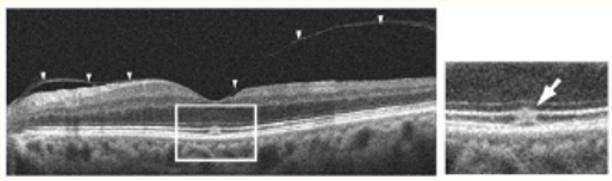

Figure 2: Cotton ball sign associated with A-P traction [8].

This region corresponds to the outer segment of cone photoreceptors, whose reflectivity is usually low. The photoreceptor outer segments (OSs) contain stacks of membranous discs that are rich in visual pigments, and the OSs are aligned parallel to the light pathway. It is suggest that the inward traction on the retina changes the alignment of the OSs, which then increases their reflectivity [8].

Release of the inward traction either surgically or spontaneously (PVD) caused disappearance of the cotton ball sign after a variable lapse of time [8].

The cotton ball sign does not necessarily indicate a decrease in visual acuity and it may be used as a predictor of visual impairment that would arise after longstanding inward traction at the fovea. Continuous foveal traction is known to cause microstructural damages in the photoreceptor layer and early detection of this sign may help in the management of these patients in preserving good vision [8].

Hyperreflective foveal spot (HFS)

Hyperreflective foveal spot appears as a hyperreflective vertical alteration between the external limiting membrane and the internal limiting membrane at the level of the fovea, with partial involvement of the external retinal bands [9].

Gass suggested that the center of the fovea shows a peculiar aggregation of Müller cells that appear more vertically oriented at this level than in any other retinal region. For this reason, the central fovea might be particularly sensitive to mechanical stress, with changes in the normal disposition of Müller cells interleaved with cones [10].

Müller cells might therefore be able to transmit mechanical stress to photoreceptors. If the traction exerted by the Müller cells exceeds the adhesive force between the photoreceptors and retinal pigment epithelium, the cones might lose their relationship with this layer, with consequent development of a vertical line made up of accumulated photoreceptor debris [9].

Retinal vascular alteration in the superficial and deep retinal capillary plexuses but not in the choriocapillaris was detected both in the affected and in the apparently normal contralateral eyes. This result might suggest that concomitant patient predisposition has a role in the future development of vitreoretinal abnormalities (macular hole, pseudohole, or ERM). With this in mind, OCT-based investigations might provide useful biomarkers for an earlier diagnosis of vitreoretinal interface diseases [9].

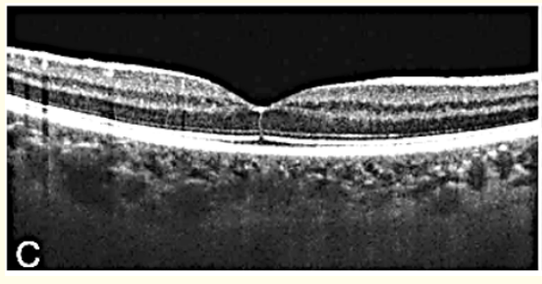

Figure 3: HFS in a case with persistent vitreous adhesion [9].

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