CAS Diagnostica FHNW

Case Report #3

Glaucomatous Changes

and Lamellar Macular Hole (LMH)

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History and Symptomes

A 68 years old Caucasian male (#1266) first visited our clinic to get his eyes checked and get a new prescription for his glasses. His last visit at an Ophthalmologist was about 3 years ago, where his glasses were prescribed.

His subjective vision at far with her current glasses was normal, during the day he uses his single vision glasses with which he also can read daily things. In the evenings he has multifocal glasses for reading with the same prescription at far.

Refractive History

Current glasses from 2017:

OD: -6.75 -0.50 70° Add 2.25 VA 0.8+3

OS: -6.50 -1.00 95° Add 2.25 VA 0.5

His ocular history is negative of any treatments and injuries. His family ocular history includes glaucoma and his medical history with benign prostrate hyperplasia for which he is prescribed with Finasterid.

Differential Diagnosis

- Cataract
- AMD
- Glaucoma
- Other retinal findings

Eye Exam

Subjective refraction

OD: -6.75 -1.00 75° Add 2.25 Vis 1.0-1

OS : -6.25 -1.25 75° Add 2.25 Vis 0.6+2

VD: 13mm

Motility testing showed no extraocular muscle restriction in any direction, both pupils were round and equal in size and reacted prompt to direct and indirect illumination. No RAPD was noted.

Cover-Test: Ortho-phoria

Airpuff-NCT: OD: 17.7 OS: 17.0 mmHg @ 10:30 am

Anterior Segment

OU: lid and lashes normal, conjunctiva within normal limits with mild nasal and temporal pinguecula, central cornea clear, periphery circumferential arcus senilis, no fluorescein positive staining, limbal vasculature within normal limits, van Herrick 2:1 nasal and temporal, anterior chamber no flare, no cells, crystalline lens within normal limits relative to his age, no floaters in the anterior vitreous.

Posterior Segment

Right eye: normal macular pigmentation, marked peripapillar atrophy, A/V-ratio: 2/3, normal appearance (Fig. 1).

Optic nerve head: vital, sharply defined, moderate tilted, horizontal oval, doesn't follow the rule of ISNT, deep cup and lamina is visible, retinal nerve fiber layer (RNFL) shows superior thinning, C/D ratio h: 0.5/ v: 0.7

OCT: Macular contour moderate deformation after complete posterior vitreous detachment (PVD) (Fig. 3).

GCC: within normal limits compare to normative database

ONH: noticeable superior and supero-nasal thinning of RNFL (Fig. 6).

Left eye: normal macular pigmentation, epiretinal membrane wrinkling, oval shaped redish macular leasion, peripapillar atrophy, A/V-ratio: 2/3 (Fig. 2).

Optic nerve head: vital, sharply defined, extrem tilted, horizontal oval, ISNT borderline, deep cup and lamina is visible, C/D ratio h: 0.4/ v: 0.4

OCT: Macular contour moderate deformation with a lamellar macular defect, epiretinal membrane (ERM) formation with inferior adhesion and traction (1DD inferior fmom Macula OCT Retina 3D scan) (Fig. 4 & 5).

GCC: within normal limits compare to normative database; but taken with caution, because of difficult segmentation due to epiretinal membrane formation

ONH: mild supero-nasal thinning of RNFL, eventually due to the temporal shift of the RNFL bundles from his myopic changes (Fig. 6).

Fig. 1: *True color panorama fundus photography with DRS plus of the right eye*

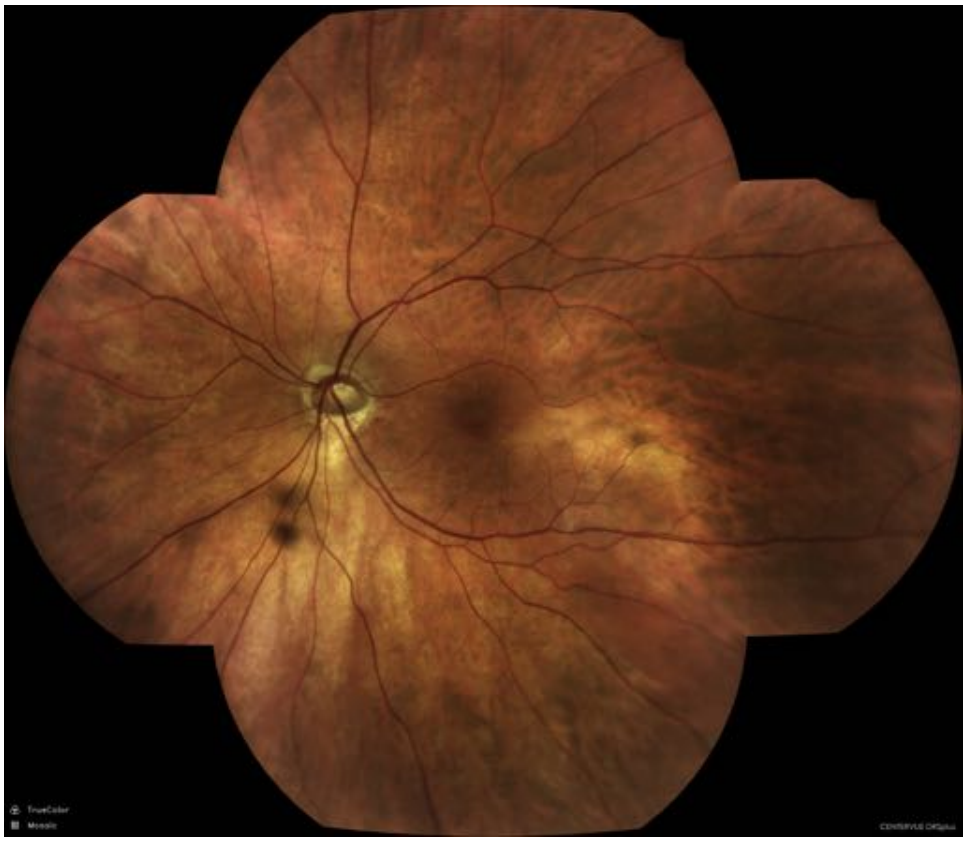

Fig. 2: *True color panorama fundus photography with DRS plus of the left eye*

OCT

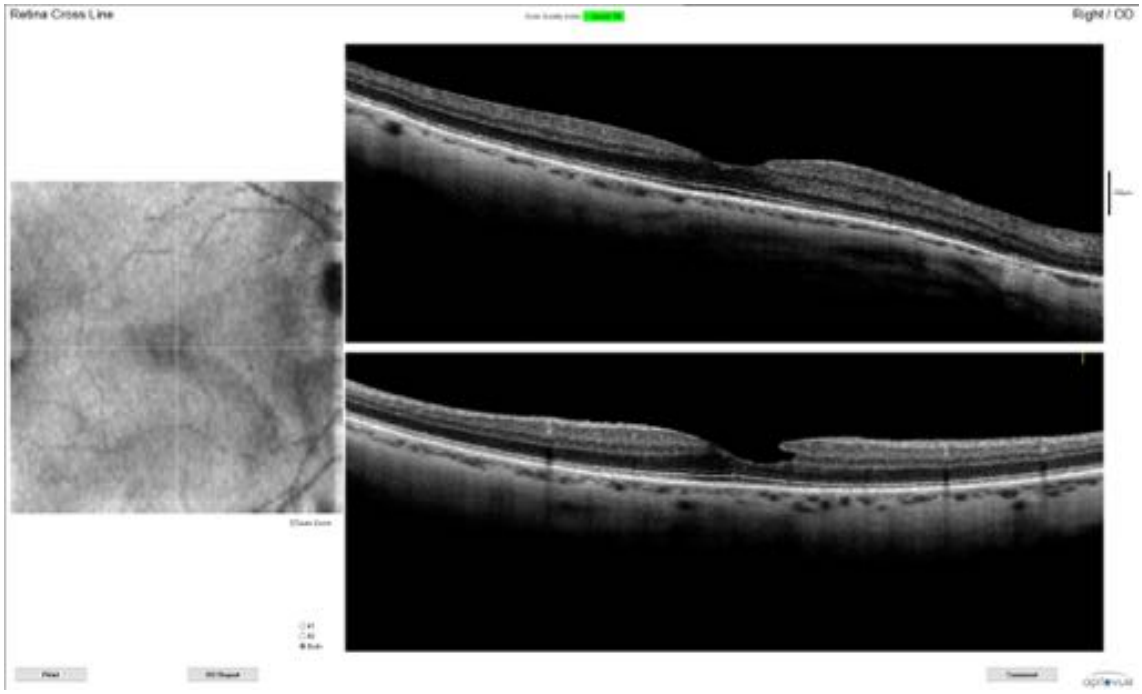

Fig. 3: *OD Macular cross-scan of the right eye*

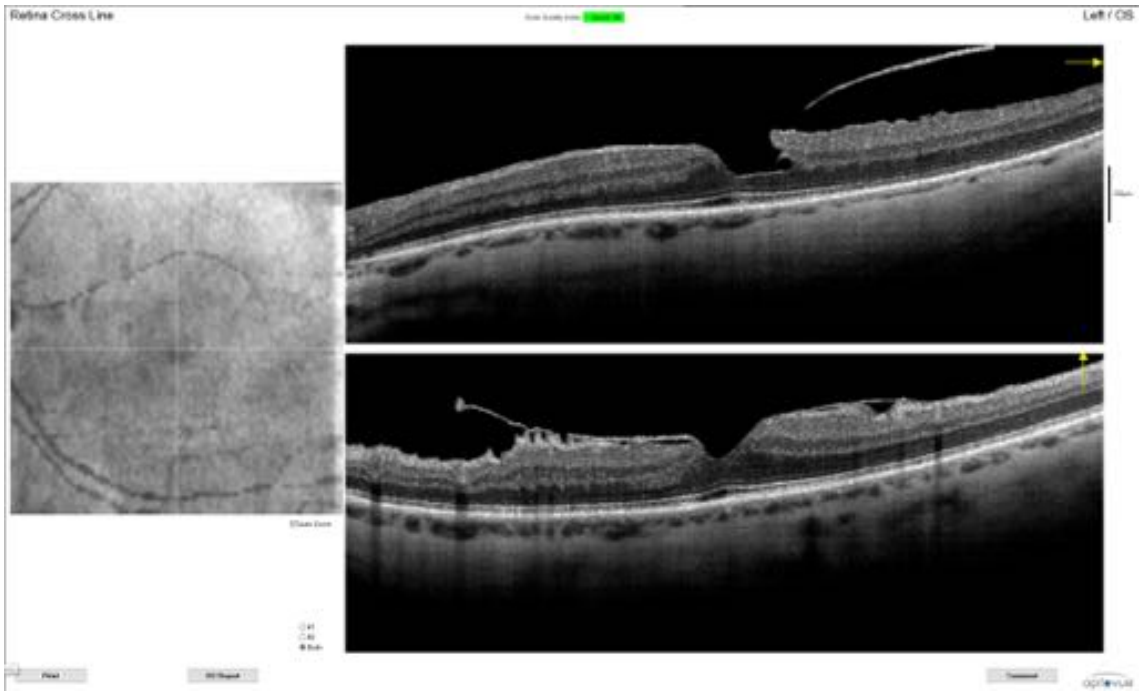

Fig. 4: *Macular cross-scan of the left eye*

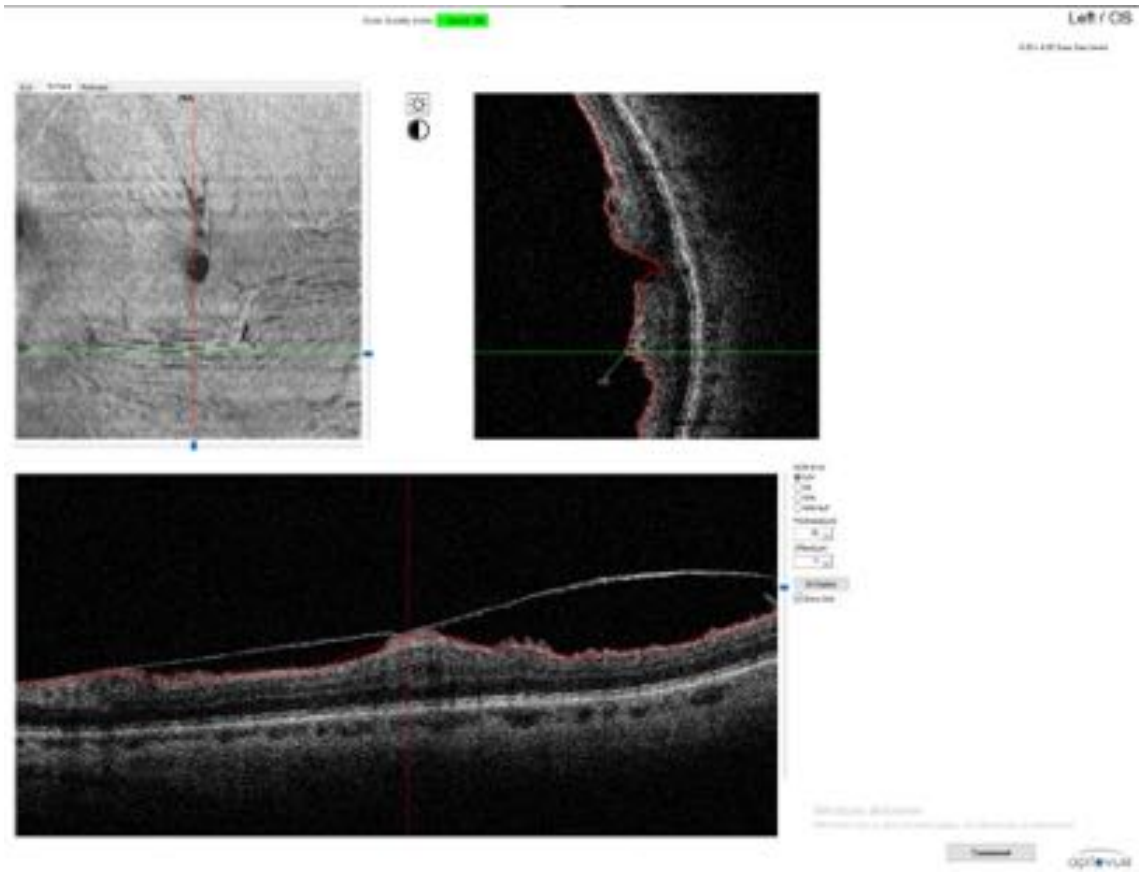

Fig. 5: *Macular 3D-scan of the left eye in en face preview*

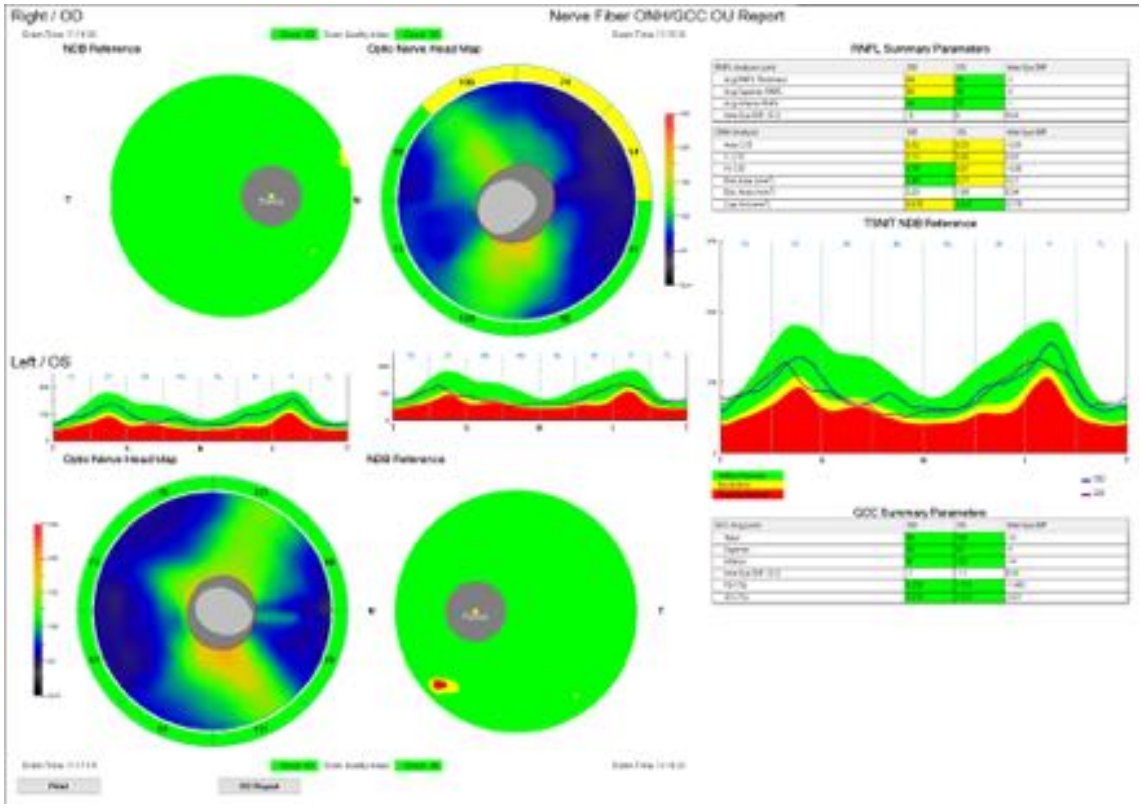

Fig. 6: *GCC- and RNFL-analysis of both eyes*

Visual Field Oculus Easyfield 30-2 Threshold

The patients first ever performed visual field (VF) testing shows reliable results. The usual learning curve is expected to refine the visual field defects.

On the right eye the visual field shows an enlarged blind spot and an infero-temporal arcuate like visualfield defect corresponding to the anatomical presentation of the RNFL at the optic disc and the large area of the peripapillar atrophy. Also it shows some superior and paracentral defects.

On the left eye the visual field shows a paracentral to supero-temporal defect.

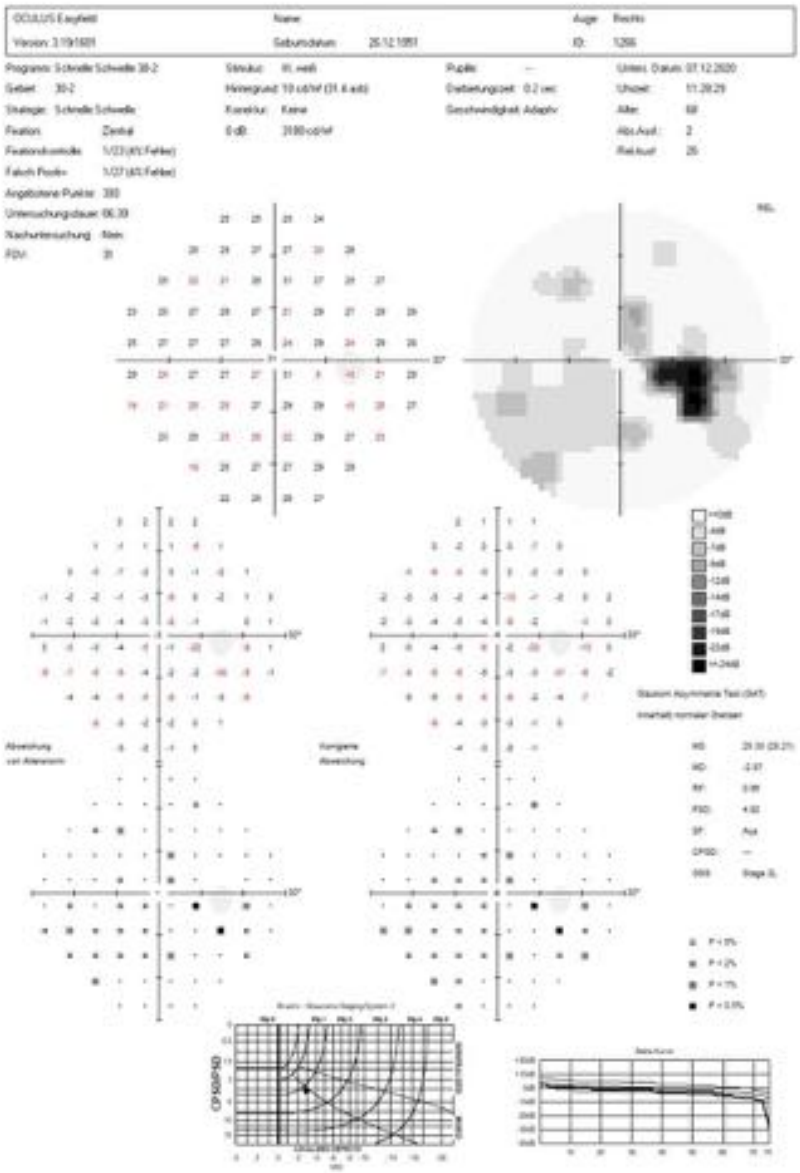

Fig. 7: *30-2 Threshold Visual field of the right eye*

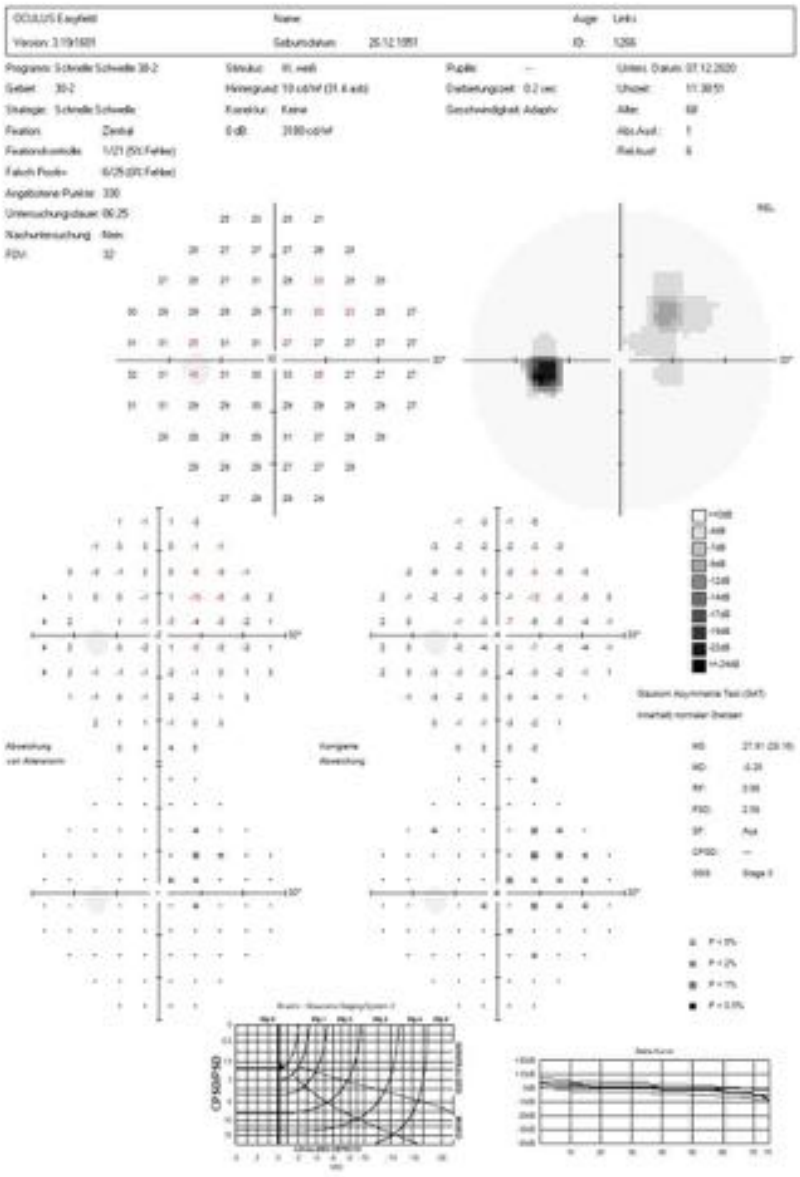

Fig. 8: *30-2 Threshold Visual field of the left eye*

Diagnosis and plan

Based on the objective finding a priamary open angle glaucoma (POG) on the right eye and glaucoma suspect on the left eye was diagnosed. On the left eye an incomplete PVD with retinal traction, epiretinal membrane and a lamellar macular hole was found in OCT imaging. Therefore the patient was referred to the ophthalmologist for a glaucoma and dilated retinal workup within the next 4-6 weeks.

Discussion

Based on his age a few changes of the ocular health could be expected. Cataract was ruled out based on a clear reflex in retinoscopy and slit-lamp examination of the lens crystalline.

AMD could also be ruled out based on the normal findings of the pigmentation in the macular area. OCT imaging confirmed normal finding of the Bruchs-RPE complex.

Based on the anatomical structure of the optic nerve head in funduscopy and fundus photography, analysis of the RNFL complex a the ONH and the visual field defects a POG on the right eye was diagnosed with relatively normal IOP. The left eye was diagnosed as a glaucoma suspect based on anatomical findings of the ONH and visual field defects. These findings suggest a glaucoma treatment on the right eye. Also a repeated visual field testing is required to refine the VF defects on both eyes and to follow up the treatment regime of the right eye.

As for the central retinal findings on the left eye an epiretinal membrane, vitreomacular traction and a lamellar macular hole (LMH) was diagnosed. Witkin et al.[1] defined LMH on four criterias: first an irregular foveal contour, second break in the inner fovea, third separation of the inner from the outer retinal layers at the fovea and fourth the absence of a full thickness hole with intact foveal photoreceptors. All four criterias were met in the left eye. Chen et al.[2] found the ratio of opening of the hole and defect in the outer retina to be smaller in LMH compared to macular pseudo holes (MPH) which is marked by steep contour. Also VA was more affected in LMH compared to MPH. Both criterias were met in the left eye.

Although a combination of a MPH is assumed, due to the centripetal contraction of the ERM which Ho et al.[3] describes as lamellar hole-associated epiretinal proliferation (LHEP). These patients have poorer visual acuity compared to changes due to ERM.

On the right eye a similar appearance was seen just in a milder manner. Therefore, on the right eye no surgical intervention is required but observation every 6 months. In the left eye a vitrectomy with membrane peeling could be considered to improve VA[4]. Ho et al.[3] have shown a better VA outcome, better restoration of the ellipsoid zone and foveal contour by performing foveolar non-peeling and foveolar tissue repositioning vitrectomy.

Therefore the patient was referred to the Ophthalmologist for evaluation and treatment.

Reference

1. Witkin AJ, Ko TH, Fujimoto JG, et al. Redefining lamellar holes and the vitreomacular interface: an ultrahigh-resolution optical coherence tomography study. *Ophthalmology*. 2006;113(3):388-397. doi:10.1016/j.ophtha.2005.10.047

2. Chen JC, Lee LR. Clinical spectrum of lamellar macular defects including pseudoholes and pseudocysts defined by optical coherence tomography. *Br J Ophthalmol*. 2008;92(10):1342-1346. doi:10.1136/bjo.2007.133041

3. Ho T-C, Ho AY-L, Chen M-S. Reconstructing Foveola by Foveolar Internal Limiting Membrane Non-Peeling and Tissue Repositioning for Lamellar Hole-Related Epiretinal Proliferation. *Sci Rep*. 2019;9(1):16030. doi:10.1038/s41598-019-52447-4

4. Wong JG, Sachdev N, Beaumont PE, Chang AA. Visual outcomes following vitrectomy and peeling of epiretinal membrane. *Clin Experiment Ophthalmol*. 2005;33(4):373-378. doi:10.1111/j.1442-9071.2005.01025.x