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LETTER TO THE EDITOR

Outer retinal tubulations in maternally inherited diabetes and deafness (MIDD)-associated macular dystrophy

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Dear Editor

Outer retinal tubulations (ORT) have recently been described as a unique but non-specific OCT (optical coherence tomography) finding in age-related macular degeneration, retinal dystrophies and chronic central serous retinopathy [1, 2]. On SD-OCT, these tubulations appear as round to ovoid structures, usually with hyper-reflective walls and relatively hypo-reflective cavity. Zweifel et al. [1] are credited with the first detailed description of ORT, and in their case series of 63 patients with varied pathology, one patient with A3243G macular dystrophy phenotype (mitochondrial inherited disorders) was mentioned. However, the details of that particular patient were not reported.

A 70-year-old Caucasian female was referred by her optometrist with suspicion of age-related macular degeneration. She did not report any visual loss, but was concerned about her 'retinal condition', especially as the optometrist had raised the concern of wet AMD. She had been diagnosed as having MIDD (maternally inherited diabetes and deafness) about 10 years back, confirmed with mitochondrial DNA mutation A3243G, and ophthalmic consultation had confirmed typical MIDD-associated macular pattern dystrophy, with no diabetic retinopathy changes. She was advised annual ophthalmic review, but was subsequently lost to follow-up. Generally she was fit and well apart from mild hearing loss.

Visual acuity was 0.2 LogMAR (6/10 Snellens) unaided in both eyes.. Anterior segment examination was unremarkable, with normal intraocular pressure. Detailed retinal evaluation showed bilateral symmetrical peripapillary and parafoveal RPE atrophy with relative foveal sparing (Fig. 1), but no features of diabetic retinopathy. Fundus autofluorescence, infra-red reflectance near infra-red autofluorescence showed corresponding signal loss in zones of RPE and photoreceptors atrophy. No distinctive feature of ORT is noted on infra-red reflectance or autofluorescence images. Figure 2 shows the SD-OCT (Spectralis) B-scan images of the right eye showing outer retinal tubulations at varying levels above the RPE in zones of atrophic retina. Similar changes were noted on imaging the left eye (not shown).

To our knowledge, this is the first case report detailing outer retinal tubulations (ORT) using multimodality autofluorescence imaging and SD-OCT, in a documented A3243G MIDD-associated macular dystrophy. MIDD with macular involvement is a well-known but uncommon cause of diabetes and deafness, and may show A3243G mitochondrial DNA mutation, usually with varying phenotypic variability [3–5]. Two distinct features of MIDD-associated macular dystrophy, noted in our case as well, include the involvement of peripapillary area (a distinguishing feature compared to Stargardt's disease, in which peripapillary area is relatively unaffected) and absence of significant clinical diabetic retinopathy. The clinical and histo-pathological correlation is yet to confirm whether the ORT are indeed 'rosettes' formed by the photoreceptors and theorized in

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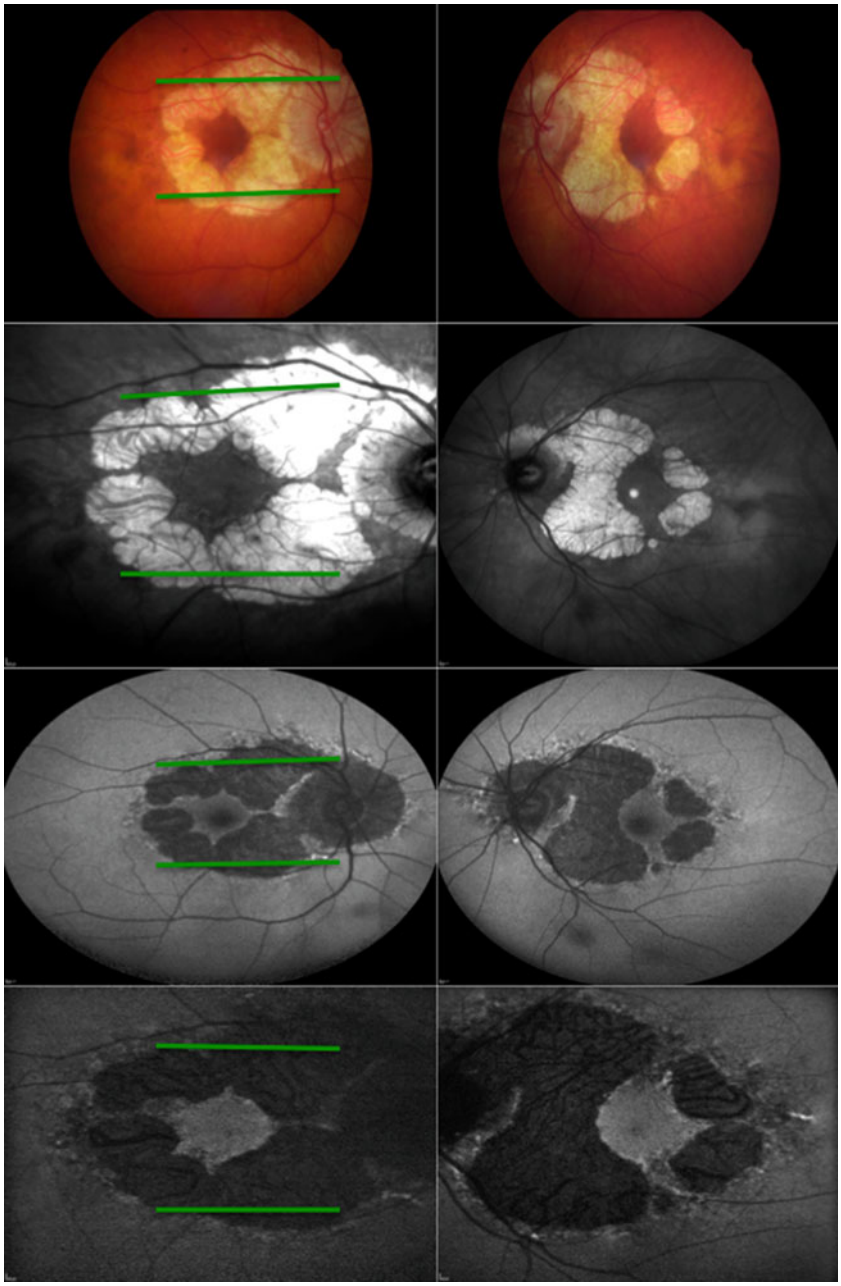

Fig. 1 Colour photos (*top row*) clearly show symmetrical bilateral pattern dystrophy typical of MIDD. Rows two to four respectively show the HRA2 (Heidelberg) obtained images showing IR (infra-red reflectance), FAF (*Blue peak* autofluorescence) and NIA-FAF (near infra-red autofluorescence). Note the opposite foveal signal generated by employing different wavelengths for autofluorescence signal in rows three and four. *Green markers in the left column* show the corresponding level of ORT lesions noted on the B-scans in Fig. 2

detail by Zweifel et al. and others [1, 2]. As a diagnostic sign, presence of ORT is non-specific. However, it is important not to mistake these OCT findings as "active intraretinal or sub-retinal fluid" necessitating diagnosis or treatment as wet AMD. Almost always, the outer retinal bands corresponding to ELM and IS-OS (or IS ellipsoid) on SD-OCT are absent/disrupted in the area of the ORT. With newer OCT imaging techniques such as en-face (C scan) and polarization-sensitive OCT, the internal morphology and RPE changes might be better reported in future.

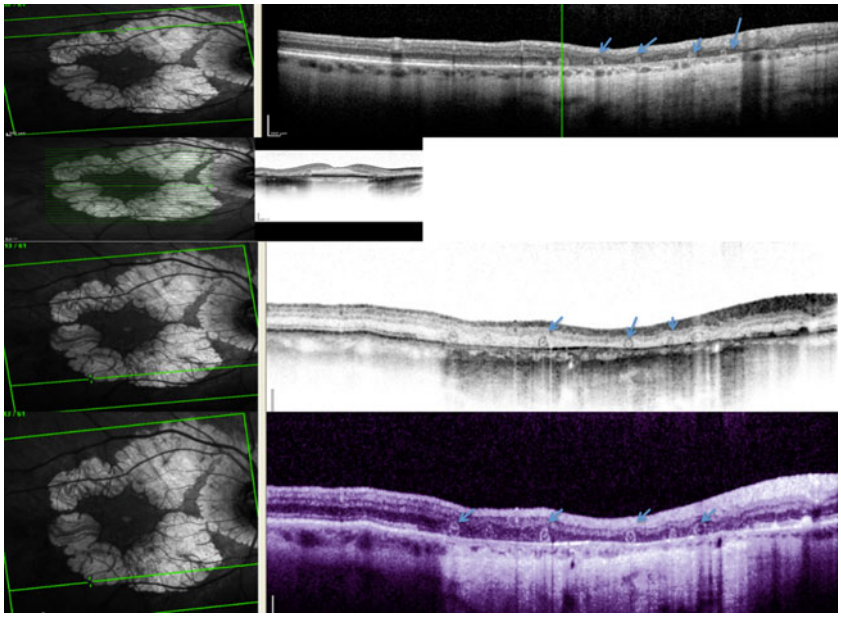

Fig. 2 Spectralis OCT B-scans showing three representative levels with round to oval ORTs (outer retinal tubulations) (*blue arrows)*, with superimposed eye-track position marker in the top image only, with SLO-like image on the *left column*. Note the top and bottom images are viewed in different machine settings to reveal varying contrast for recognition. Bottom photograph shows use of native machine (Spectralis) software to enhance contrast (*arrows*). Similar ORTs were noted in the left eye OCT scans as well (not shown)

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