CASE REPORT

Macular hole closure following spontaneous release of vitreomacular traction

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SUMMARY

We describe the temporal changes observed with spectral-domain optical coherence tomography (SD-OCT) in the left eye of a 65-year-old man who developed a stage 1 macular hole secondary to vitreomacular traction (VMT). After 1 month, VMT had resolved spontaneously with a complete posterior vitreous detachment. Following VMT resolution, macular hole demonstrated progressive improvement and outer retinal disruption recovered spontaneously. This report highlights the importance of observation before any intervention for cases of stage 1 macular hole associated with VMT.

BACKGROUND

Vitreous degeneration and biochemical changes of the vitreoretinal interface lead to posterior vitreous detachment (PVD) in an ageing eye. If the vitreous–retina attachment is strong in the macular region at the time of PVD, incomplete vitreous separation may lead to vitreomacular adhesion (VMA), which may progress to retinal traction and vitreomacular traction (VMT).¹ The introduction of spectral-domain optical coherence tomography (SD-OCT) in ophthalmology resulted in comprehensive understanding of the vitreomacular interface disorders.² OCT allows visualisation of the tractional forces and retinal microstructure and the effects of PVD can be evaluated much more precisely. Foveal contour is normal without traction at the VMA stage. However, in some cases, the tractional effect increases and demonstrates a set of findings including steep slope of the inner macular surface and sharp angulation localised at the VMA site.³ Resulting anatomical changes in the vitreoretinal interface is termed VMT syndrome. VMT syndrome may be associated with cystoid macular oedema, epiretinal membrane and macular hole formation.⁴

Stage 1 macular hole was first described as a foveolar yellow spot without vitreofoveal separation by Gass.⁵ Presumed aetiology for stage 1 macular hole formation is VMT. Progression to stage 2 full-thickness macular hole is reported in ~50% of cases.⁶ The other 50% show spontaneous resolution following the release of VMT. Therefore, observation without intervention is the first choice for many retinal surgeons. Surgery is reserved for eyes that demonstrate definite progression to stage 2 macular hole.^{7 8}

Several potential treatment options are available for eyes with VMT including, vitrectomy, intravitreal ocriplasmin injection and intravitreal gas injection. A period of observation is advised in most

uncomplicated cases, including the ones with stage 1 macular hole. Here we describe SD-OCT findings of a patient with spontaneous closure of stage 1 macular hole after VMT resolution.

CASE PRESENTATION

A 65-year-old man presented to the retina clinic with decreased vision and metamorphopsia in the left eye. His past medical history was unremarkable. Anterior segment examination showed mild nuclear sclerosis in both eyes. Posterior segment examination revealed a partial PVD, vitreous syneresis and a blunted foveal light reflex in the right eye. Left eye had a choroidal nevus superiorly. Best corrected visual acuity was 20/20 in the right eye and 20/40 in the left eye. Intraocular pressures were within normal limits. SD-OCT of the macula demonstrated a pseudocyst, VMT and outer retinal changes including interruption of the photoreceptor ellipsoid zone (EZ) in the fovea, consistent with a stage 1 macular hole in left eye (figure 1). Careful review of the full set of high-resolution raster SD-OCT scans, including radial, vertical and horizontal sections, ruled out any full thickness macular hole component. A 1-month follow-up visit showed a complete PVD with the release of foveal VMT in the left eye. The outer retina demonstrated improving foveal EZ changes. The foveal pseudocyst was completely resolved by 3 months with residual EZ disorganisation. At the 6-month follow-up, OCT examination revealed a complete closure of macular hole with an intact foveal EZ. The best corrected visual acuity was 20/32 at 1 month, 20/30 at 3 month and 20/20 at 6 month visit.

DIFFERENTIAL DIAGNOSIS

Differential diagnosis of metamorphopsia in a 65-year-old patient includes several macular diseases:

- ▶ Epiretinal membrane
- ▶ VMT syndrome
- ▶ Macular hole
- ▶ Age-related macular degeneration
- ▶ Cystoid macular oedema
- ▶ Toxic maculopathy
- ▶ Choroidal neovascular membrane
- ▶ Central serous chorioretinopathy
- ▶ Retinal detachment

DISCUSSION

Vitreous liquefaction and PVD are degenerative processes of the ageing eye characterised by separation of the posterior vitreous cortex from the

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Figure 1 SD-OCT images of the left eye. (A) At initial presentation, VMT with a foveal pseudocyst is present, demonstrating a stage 1 macular hole. (B, C) Follow-up visits revealed a smaller stage 1 macular hole after spontaneous resolution of VMT. (D) Normal foveal anatomy was restored 6 months after the initial presentation. SD-OCT, spectral-domain optical coherence tomography; VMT, vitreomacular traction.

internal limiting membrane of the neurosensory retina. Vitreous liquefaction before complete vitreous separation promotes VMT and may lead to the development of macular disorders including, VMT syndrome, idiopathic macular hole and macular pucker.⁹ Hikichi *et al*¹⁰ previously reported on the natural course of VMT and showed that 81% of patients had cystoid macular changes, and 67% had persistent macular oedema during the follow-up period of 60 months. The final visual acuity decreased in 34% of cases with VMT syndrome. Only 11% of the patients with VMT syndrome developed spontaneous resolution of VMT. However, this study was performed with fundoscopic examination before the OCT era. A recent study by Odrobina *et al* characterised the natural course of VMT syndrome using SD-OCT. The authors observed spontaneous resolution of VMT in nine of 19 eyes (47%).⁸ They found complete regression of intraretinal cystic spaces in six of 19 eyes, and PVD was present in all six eyes. The authors concluded that intraretinal cystic spaces were due to the vitreoretinal traction and resolution of traction allowed improvement of the cystic spaces and recovery of normal foveal contour.

Our case is an example of spontaneous improvement of a stage 1 macular hole following VMT resolution during close clinical observation. We demonstrate complete recovery of the foveal anatomy by SD-OCT at the end of the follow-up period. Several investigators have reported spontaneous closure of idiopathic macular holes.¹¹ Common presumed aetiologies of macular hole closure reported in the literature include

completion of PVD and contraction of epiretinal macular membranes.^{11–13}

Several surgical and non-surgical treatment options exist for patients with VMT syndrome. Cases with poor visual acuity and progressive macular traction may require surgery or pharmacologic lysis.¹⁴ The main goal of vitrectomy is to release the residual VMA and restore normal central retinal structure by eliminating anteroposterior and tangential vitreoretinal traction. Ocriplasmin is a novel intravitreal agent that promotes PVD formation and leads to VMT resolution in select cases.¹⁵ Similarly, intravitreal injections of octafluoropropane (C3F8) and sulphur hexafluoride (SF6) have been shown to resolve VMT and are minimally invasive alternatives to vitrectomy.^{16 17} In our case, there was rapid and spontaneous resolution of VMT with a complete PVD formation. A normal foveal contour was achieved without any intervention. As seen in our patient, spontaneous resolution of VMT in many cases warrants a period of careful observation and may negate the need for more invasive measures including intravitreal injection or vitrectomy, thus minimising unnecessary risk to patients.

Learning points

- ▶ Vitreomacular traction (VMT) may lead to macular hole formation.
- ▶ Spontaneous release of VMT may restore retinal anatomy and facilitate the closure of the macular hole without any surgical intervention.
- ▶ Spectral-domain optical coherence tomography (SD-OCT) provides detailed anatomic information and is an essential tool for monitoring vitreoretinal interface disorders.
- ▶ Detailed image analysis using high-resolution SD-OCT imaging of radial, horizontal and vertical sections is important for ruling out a full thickness component of early stage macular hole.
- ▶ Sequential examination with SD-OCT is recommended for patients with VMT.

Contributors CGB was the provider for the case. He made the decision for publishing and made the critical review for preparing the manuscript. CO performed the literature search and wrote the article.

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