Unexpected outcome (positive or negative) including adverse drug reactions

Spontaneous resolution of grade 2 macular hole observed with optical coherence tomography

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Summary

A 56-year-old woman presented with decreased vision and metamorphopsia in her left eye for 3 months. She received a diagnosis of stage 2 idiopathic macular hole in her left eye, which was made with a tomographic image of a full-thickness dehiscence of the neurosensory retina at the fovea. The posterior hyaloid membrane was adhering to the edge of the dehiscence. After a 6-month follow-up period, spontaneous resolution of the macular hole was observed with good visual recovery; all of this clearly demonstrated by optical coherence tomography. The posterior hyaloid membrane was fully separated from the fovea with restoration of almost normal foveal contour.

BACKGROUND

Our case emphasises the importance of optical coherence tomography (OCT) examination, which is obligatory to study both the development and the resolution of macular holes. OCT follow-up enabled monitoring of the closure mechanisms and complex surgery can be avoided by a short observational period.

CASE PRESENTATION

A 56-year-old woman presented with decreased vision and metamorphopsia in her left eye for 3 months. Best corrected vision in the affected eye was 20/400 and 20/50 in the right eye. Ophthalmoscopy and biomicroscopy of the left eye revealed a small, full-thickness macular hole without a cuff of subretinal fluid. A Watzke–Allen test had a positive result. No posterior vitreous detachment was identified clinically. She reported a central metamorphopsia on Amsler grid testing of the left eye. In the fellow eye fundus, the disk and retinal vasculature appeared healthy. The macula was within normal limits. There was no evidence of premacular hole-type pathology. A posterior vitreous detachment was not detected clinically. Intraocular pressures were within normal limits in both eyes. The peripheral examination was unremarkable in both eyes. Medical, social and family history was inconclusive.

INVESTIGATIONS

An OCT image of the left eye done on the first visit disclosed a dehiscence of the neurosensory retina with a slightly elevated nasal retinal edge containing intraretinal cysts. The posterior hyaloid membrane containing operculum-like tissue was adhering to the nasal edge of the retina (figure 1B). A stage 2 macular hole was diagnosed. The fellow eye showed normal foveal contour with OCT (figure 1A).

DIFFERENTIAL DIAGNOSIS**Cystoid macular oedema**

Biomicroscopy of the retina usually reveals the presence of an inner layer of large cyst as well as the surrounding cystoid spaces in eyes with cystoid macular oedema. OCT shows central cysts, loss of foveal depression and macular thickening in cystoid macular oedema. On fundus fluorescein angiography (FFA) there is a petalloid pattern of dye leakage from the perifoveal capillaries.

Epiretinal membrane

On biomicroscopy, epiretinal membrane has a fibrotic appearance with distortion of perifoveal vessels. A central opening in the membrane might mimic a retinal defect (pseudomacular hole). OCT is useful in the differentiation of a pseudomacular hole and a full-thickness macular hole as in a pseudomacular hole a visible gap is seen in the hyper-reflective epiretinal membrane with near normal foveal thickness.

Central serous chorioretinopathy

Biomicroscopy reveals a neurosensory retinal detachment without a neurosensory retinal defect. FFA shows either ink-blot pattern or smoke stack pattern. OCT is a non-invasive technique that can demonstrate the presence of subretinal fluid in central serous chorioretinopathy.

Vitreomacular traction syndrome

Stage 1 macular hole and lamellar macular hole may mimic vitreomacular traction syndrome but, in these, neither the vitreomacular attachment nor the pre-retinal tissue is prominent. OCT has clarified the anatomic features of vitreomacular condition with unprecedented precision.

OUTCOME AND FOLLOW-UP

Three months after the first visit there was no change in metamorphopsia in the left eye. Visual acuity slightly

Figure 1 Serial optical coherence tomographic images of a normal right eye (A,C,E) and affected left eye (B,D,F). (A) The right eye showing normal foveal contour at first visit. (B) The left eye at first visit shows a full-thickness stage 2 macular hole with perifoveal cyst formation in the slightly elevated nasal edge of the neural retina to which a posterior hyaloid membrane and a pseudo-operculum were adherent (as depicted by the blue arrowhead). (C) The right eye showing normal foveal contour at second visit. (D) The left eye 3 months after first visit. A small neurosensory retina bridge can be seen over an intraretinal cystic area. The posterior hyaloid membrane was detached (as depicted by the green arrow head). (E) The right eye showing normal foveal contour at the third visit also. (F) Macular optical coherence tomography of the left eye after 6 months of diagnosis, evidencing a restoration of the macular morphology, with a small discontinuity of the photoreceptor layer and a very small intraretinal cyst.

improved to 20/200 and, upon examination, it seemed that the hole was closed. OCT demonstrated complete peripheral vascular disease (PVD) with closure of the macular hole in the left eye with a small subretinal cyst and photoreceptor discontinuity (figure 1D). Over 6 months of follow-up, visual acuity of the left eye improved to 20/40 with +0.5 D/−1.25 D cyl at 90° and OCT demonstrated almost complete absorption of the intraretinal cyst and restoration of the normal foveal contour. Only a subtle discontinuity of the photoreceptor layer and a very small intraretinal cyst was still noticeable – a fact that may explain the still decreased visual acuity (figure 1F). The right eye remained unchanged during this period (figure 1C,E).

DISCUSSION

Idiopathic macular hole was identified as a unique clinical entity more than 100 years ago.^{1,2} Most macular holes occur as an age-related primary idiopathic condition unrelated to other ocular problems or antecedent events. The hallmark inciting event of idiopathic macular hole formation is hypothesised to be focal shrinkage of the vitreous cortex in

the foveal area.³ The tractional forces of the vitreous can be observed clinically with contact lens examination, with ultrasonography and, most reliably, with OCT.^{4,5} As suggested and later revised by Gass,^{6,7} macular holes were commonly classified into four stages. Stage 1, also known as an ‘impending macular hole,’ was characterised by a foveal cyst within the retina. Stages 2–4 included full-thickness macular holes, which were further divided into smaller holes 400 µm in diameter (stage 2), holes larger than 400 µm in diameter (stage 3) and with complete PVD (stage 4).

It has been clinically established that stage 1 impending macular holes have a 50% chance for spontaneous closure with resolution of symptoms⁸ and are, therefore, observed and not treated surgically. Closure of full-thickness macular holes is less frequent; therefore, these cases are usually treated surgically by pars plana vitrectomy, with or without internal limiting membrane peeling. Spontaneous resolution with hole closure and a restoration of the normal foveal contour is very rare in full-thickness macular holes (stages 2–4). It occurs in 2–4% of eyes, probably secondary to epiretinal membrane formation.^{9,10} Guyer *et al* conducted a

retrospective study on the natural history of idiopathic macular holes.¹¹ Resolution, defined as an ophthalmoscopic appearance of a flat, reddish lesion and improved vision, was observed in 15 of 19 (79%) eyes with a stage 1 macular hole, in 3 of 9 (33%) eyes with a stage 2 macular hole and in 3 of 66 (5%) eyes with a stage 3 macular hole. Kakehashi *et al* reported this occurrence in 1 of 17 eyes with grade 2 macular hole,¹² Hikichi *et al* found no such resolution in 48 eyes with grade 2 macular hole,¹³ and Casuso also reported a series of 15 eyes in which such resolution did not occur during 5 years of follow-up.¹⁴ Ezra *et al*, comparing the results of treating the complete idiopathic macular hole by surgery versus observation, concluded that 11.5% of idiopathic macular holes type 2 close spontaneously in the 3–6 months after diagnosis, whereas in types 3 and 4 this occurs only in 3–6% of cases. In addition, it is estimated that visual acuity improvement is slight, only in 3–10% of cases, and even worsens in the first months.¹⁵

Four explanations have been proposed for the spontaneous resolution of a macular hole: complete detachment of the posterior hyaloid from the foveal area leading to release of traction, cell proliferation at the base of the hole, formation of a contractile epiretinal membrane resulting in shrinkage and closure of the hole, and bridging retinal tissue across the hole.¹⁶

In our case, the OCT reveals complete detachment of the posterior hyaloid from the foveal area leading to the release of traction, and the appearance of an epiretinal bridge with some neurosensory retinal external layers over an empty subretinal area results in resolution of the macular hole. Resolution of a macular hole has been demonstrated with OCT in eyes with stage 3 or 4 idiopathic macular holes^{17 18} and traumatic macular holes.¹⁹ We present a rare case of a stage 2 macular hole that resolved spontaneously with good vision documented with OCT. A similar case was presented in 2003.²⁰ We believe that OCT examination is obligatory to study both the development and the resolution of macular holes but not in straightforward cases.

Learning points

- ▶ OCT examination is obligatory to study both the development and the resolution of macular holes but not in straightforward cases.
- ▶ OCT follow-up enabled monitoring of the closure mechanisms and complex surgery can be avoided by a short observational period, but the risk of observation versus surgery should be explained to the patient.

Competing interests None.

Patient consent Obtained.

REFERENCES

1. **Aaberg TM.** Macular holes: a review. *Surv Ophthalmol* 1970;**15**:139–62.
2. **Knapp H.** Ueber isolirtl zerreissungen der aderhaut in folge von traumen auf dem augapfel. *Area Augenheikd* 1869;**1**:6–29.
3. **Johnson RN, Gass JD.** Idiopathic macular holes. Observations, stages of formation, and implications for surgical intervention. *Ophthalmology* 1988;**95**:917–24.
4. **Kokame GT.** Clinical correlation of ultrasonographic findings in macular holes. *Am J Ophthalmol* 1995;**119**:441–51.
5. **Hee MR, Puliafito CA, Wong C, et al.** Optical coherence tomography of macular holes. *Ophthalmology* 1995;**102**:748–56.
6. **Gass JD.** Idiopathic senile macular hole. Its early stages and pathogenesis. *Arch Ophthalmol* 1988;**106**:629–39.
7. **Gass JD.** Reappraisal of biomicroscopic classification of stages of development of a macular hole. *Am J Ophthalmol* 1995;**119**:752–9.
8. **la Cour M, Friis J.** Macular holes: classification, epidemiology, natural history and treatment. *Acta Ophthalmol Scand* 2002;**80**:579–87.
9. **Freeman WR, Azen SP, Kim JW, et al.** Vitrectomy for the treatment of full-thickness stage 3 or 4 macular holes. Results of a multicentered randomized clinical trial. The Vitrectomy for Treatment of Macular Hole Study Group. *Arch Ophthalmol* 1997;**115**:11–21.
10. **Lewis H, Cowan GM, Straatsma BR.** Apparent disappearance of a macular hole associated with development of an epiretinal membrane. *Am J Ophthalmol* 1986;**102**:172–5.
11. **Guyon DR, de Bustros S, Diener-West M, et al.** Observations on patients with idiopathic macular holes and cysts. *Arch Ophthalmol* 1992;**110**:1264–8.
12. **Kakehashi A, Schepens CL, Akiba J, et al.** Spontaneous resolution of foveal detachments and macular breaks. *Am J Ophthalmol* 1995;**120**:767–75.
13. **Hikichi T, Yoshida A, Akiba J, et al.** Prognosis of stage 2 macular holes. *Am J Ophthalmol* 1995;**119**:571–5.
14. **Casuso LA, Scott IU, Flynn HW Jr, et al.** Long-term follow-up of unoperated macular holes. *Ophthalmology* 2001;**108**:1150–5.
15. **Ezra E, Gregor ZJ.** Moorfields Macular Hole Study Group Report No. 1. Surgery for idiopathic full-thickness macular hole: two-years results of a randomized clinical trial comparing natural history, vitrectomy, and vitrectomy plus autologous serum. *Arch Ophthalmol* 2004;**122**:224–36.
16. **Menchini U, Virgili G, Giacomelli G, et al.** Mechanism of spontaneous closure of traumatic macular hole: OCT study of one case. *Retina (Philadelphia, Pa)* 2003;**23**:104–6.
17. **Takahashi H, Kishi S.** Optical coherence tomography images of spontaneous macular hole closure. *Am J Ophthalmol* 1999;**128**:519–20.
18. **Freund KB, Ciardella AP, Shah V, et al.** Optical coherence tomography documentation of spontaneous macular hole closure without posterior vitreous detachment. *Retina (Philadelphia, Pa)* 2002;**22**:506–9.
19. **Yamada H, Sakai A, Yamada E, et al.** Spontaneous closure of traumatic macular hole. *Am J Ophthalmol* 2002;**134**:340–7.
20. **Imai M, Ohshiro T, Gotoh T, et al.** Spontaneous closure of stage 2 macular hole observed with optical coherence tomography. *Am J Ophthalmol* 2003;**136**:187–8.

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