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Centre for Eye Health

NEWSLETTER FOR OPTOMETRISTS

I'm pleased to let you know about a new series of resources for optometrists that is being produced by the team at CFEH.

The **Clinical Guidelines** series expands our ability to assist optometrists in practical and relevant ways.

Completely free, the guidelines will be available online and in print, and have been developed as a handy reference for patient management.

Summarising key information and recommendations, they will assist you to more effectively examine and monitor patients at-risk or showing early signs of eye disease.

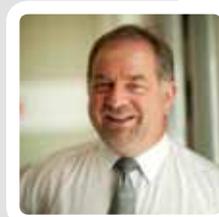
CFEH exists to provide a free advanced ocular imaging service for people who are less able to afford private care, and who cannot afford to wait to be seen in the stretched public system.

Our other key objective is to support and develop the profession of optometry, providing practitioners such as yourself with ongoing practical training, accessible information and responsive advice via our Referrer Advice Line. These guidelines are another example of how CFEH provides practical support to optometrists throughout NSW/ACT.

We are here to help you, and encourage all practitioners to make the most of this service, generously funded by Guide Dogs NSW/ACT.

If you haven't already subscribed to receive our free resources and to receive alerts about upcoming Series of Continuing Ophthalmic Professional Education (SCOPE) CPD events, please email [marketing@cfeh.com.au](mailto:marketing@cfeh.com.au) to ensure that you are on our mailing list.

**Prof. Michael Kalloniatis**  
Centre Director



clinic update

- CFEH has performed more than 50,000 advanced imaging tests on almost 10,000 people deemed at-risk of losing sight to an eye disease.
- Around 15% of people assessed at CFEH are recommended for ophthalmological assessment. After baseline testing, most of the remaining patients return to CFEH for follow-up monitoring to identify changes that suggest an early-stage eye disease.
- Please remember to include a copy of your patient's current visual field test results at the time of referral when requesting a glaucoma test suite (Option 2).
- CFEH is on Facebook. To like our page please visit [facebook.com/centreforeyehealth](https://www.facebook.com/centreforeyehealth).

**“THANK YOU SO MUCH! OUTSTANDING ALL ROUND, A SUPERB FACILITY, A PRIVILEGE TO USE. THE VISIT PUT MY MIND AT REST REGARDING THE HEALTH OF MY EYES”**

SUZANNE, CFEH PATIENT

## case profile: Macular Holes

Bob, a 66-year-old male, was referred to CFEH after his optometrist discovered visual distortion in the left eye during a routine eye examination.

Bob reported no specific problems, just a general feeling that he needed stronger spectacles. Apart from a few instances of superficial foreign bodies, there was no significant ocular history regarding either eye.

Issues to consider:

- What underlying pathologies can account for subjective distortion of vision?
- What imaging tests might determine the source of the problem?

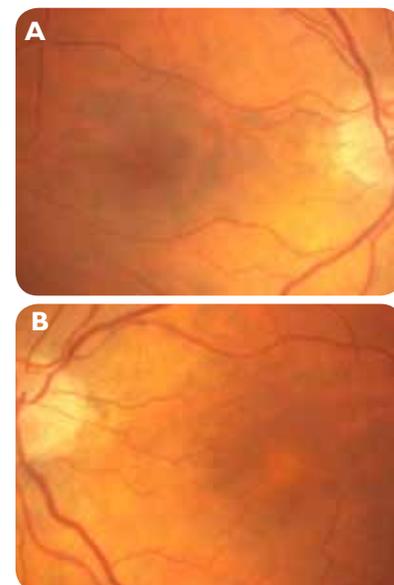


FIGURE 1: Fundus photos of right eye (A) and left eye (B) showing mild relative hypo-pigmentation at the left central macula.

continued overleaf

## case profile cont...

### Macular holes

Bob presented with spectacles for reading and a low myopic astigmatic prescription for distance.

His aided visual acuity was 6/6 in the right eye and 6/24 in the left eye, with no improvement with pinhole.

Anterior segment examination showed clear corneas in both eyes and mild to moderate nuclear sclerosis (grade 2) of comparable density in both eyes.

Funduscopy, and to a lesser extent fundus photography, illustrated a clear macula in the right eye and some hypopigmentation at the macula of the left eye.

Optical coherence tomography (OCT) showed normal retinal anatomy with vitreous detachment in the right eye.

In the left eye, a full thickness macular hole, with obvious vitreous traction, could be seen. Foveal elevation was present, more so on the nasal side, with an underlying cystoid change.

Cirrus OCT classified the central macula subfield thickness as within normal limits in the right eye and as thicker than normal limits in the left eye. The thicker central subfield thickness can partially be attributed to the vitreomacular traction and also partly due to the partially incorrect outline of the central macula which can be seen on the OCT image.

Based on the above testing the diagnosis reached was a stage two full thickness macular hole.

Bob's referring optometrist was immediately notified and ophthalmological assessment was recommended to assess possible treatment options.

This case highlights the value of OCT imaging in revealing focal macular pathology that can explain reduced visual acuity.

OCT is also valuable, as illustrated above, in the differential diagnosis of perceptual distortion, with serous macular detachment, epiretinal membrane and macular holes as possible causes.

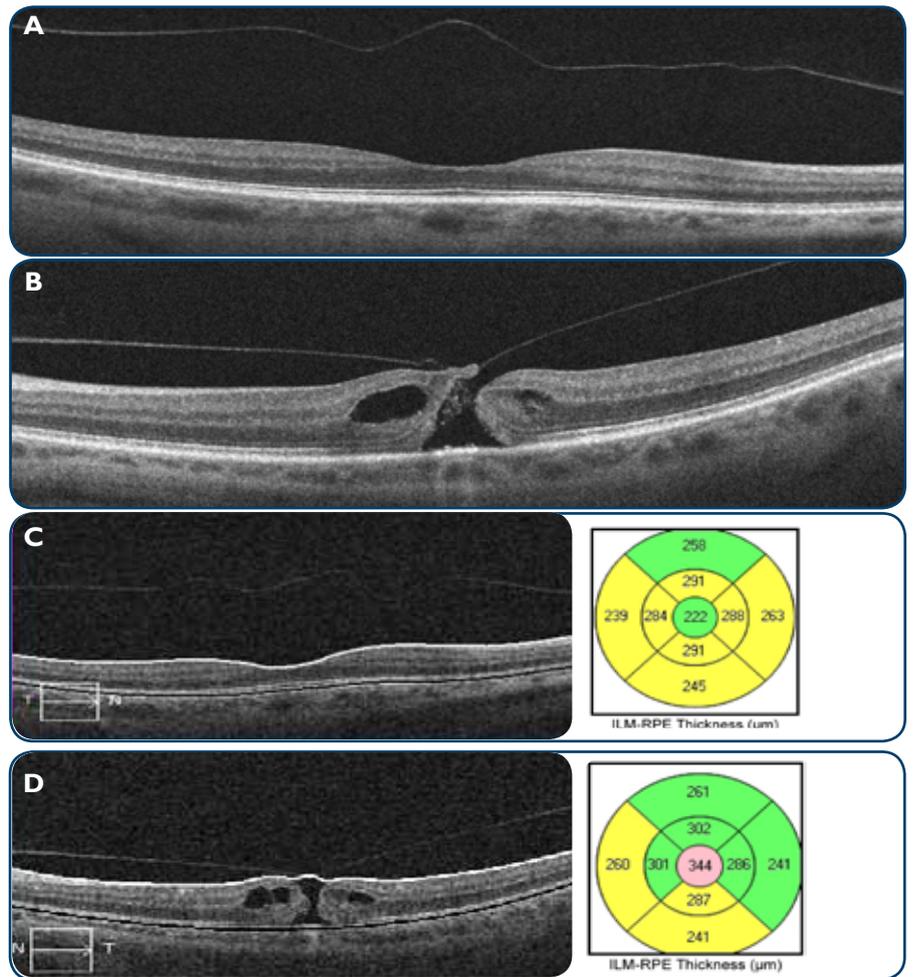


FIGURE 2: OCT line scan through Bob's right eye (A) and left eye (B) macula, showing the Stage 2 macular hole. OCT ETDRS macular thickness grid for Bob's right eye (C) and Bob's left eye (D) shows a significantly thicker central subfield in the left eye.

TABLE 1: AMERICAN ACADEMY OF OPHTHALMOLOGY<sup>13</sup>, MANAGEMENT RECOMMENDATIONS FOR MACULAR HOLE

Stage	Management	Follow-up
1-A	Observation	Prompt return if new symptoms Review every 4-6 months in the absence of symptoms
1-B	Observation	Prompt return if new symptoms Review every 4-6 months in the absence of symptoms
2	Surgery*	1 to 2 days postoperatively, then 1 to 2 weeks Frequency and timing of subsequent visits varies depending on the outcome of surgery and the patient's symptoms If no surgery, review every 4 to 8 months
3	Surgery	1 to 2 days postoperatively, then 1 to 2 weeks Frequency and timing of subsequent visits varies depending on the outcome of surgery and the patient's symptoms
4	Surgery	1 to 2 days postoperatively, then 1 to 2 weeks Frequency and timing of subsequent visits varies depending on the outcome of surgery and the patient's symptoms

\*Although surgery is usually performed, observation is also appropriate.



FIGURE 3: OCT line scan showing a Stage 1B macular hole.

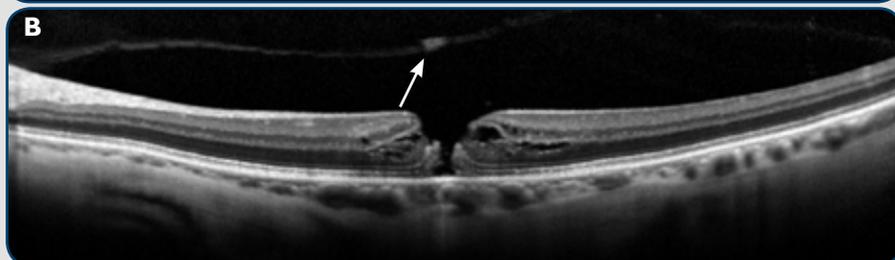
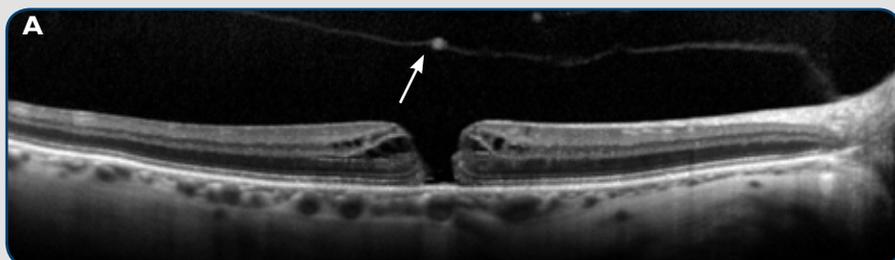


FIGURE 4: Full thickness macular hole (Stage 3) from the right eye (A) and left eye (B) of the same individual.

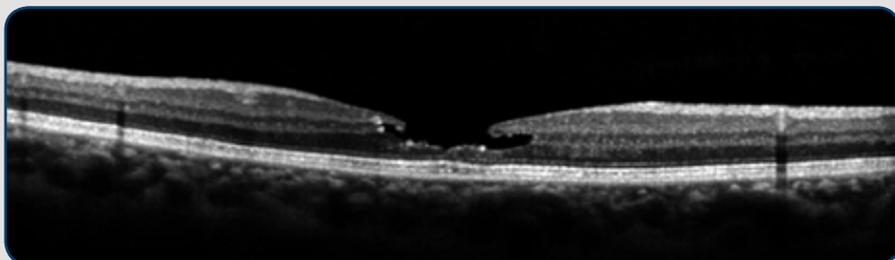


FIGURE 5: Lamellar macular hole.

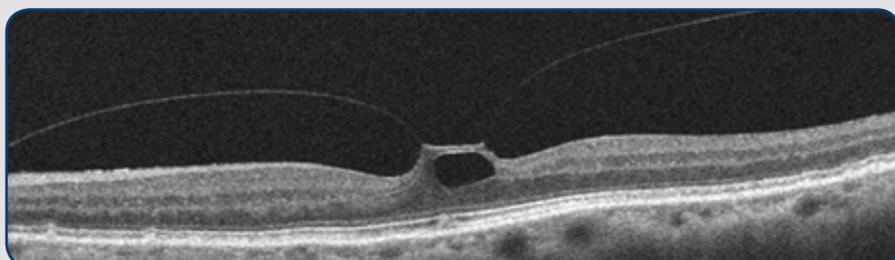


FIGURE 6: Macular cystoid space secondary to vitreomacular traction.

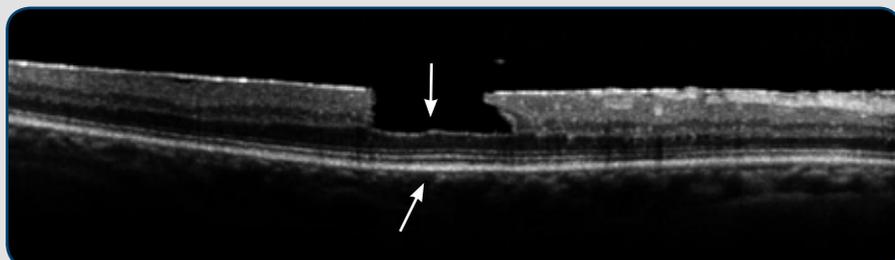


FIGURE 7: Macular pseudohole.

## spotlight on Macular Holes

Most macular holes occur as an age-related primary condition, commonly in the seventh decade of life. There is a strong female predominance<sup>1</sup>, and macular holes are bilateral in up to 17% of cases<sup>2</sup>.

Pathology attributed to macular hole formation varies, from subtle anomalies of the macular vitreoretinal interface to partial thickness (lamellar) or full-thickness breaks in the foveal neurosensory retina.

Full-thickness macular holes are thought to form largely from vitreomacular traction<sup>3</sup>, with traction tangential to the retina being significant. They tend to develop in four distinct stages:<sup>2,4</sup>

### Stage One

Known as an 'impending macular hole' this is divided into Stages 1A and 1B (Figure 3). It generally consists of subtle foveolar (1A) and foveal (1B) elevation due to vitreomacular traction, such that the normal foveal depression is absent.

Fundoscopically, a yellow spot of about 250µm (1A) or ring of about 500µm (1B) is observed centred on the foveola.

### Stage Two

Early hole formation consisting of a small, frequently eccentric, full thickness retinal hole. The posterior vitreous is still attached to the fovea at this time (Figure 2B), and there may be adjacent intraretinal cystoid spaces.

### Stage Three

Enlargement of the retinal hole to about 500µm. An operculum may be present immediately over the hole (see arrows in Figure 4A and 4B) and there is no complete posterior vitreous detachment.

Funduscopy will show yellow-white deposits at the level of the retinal pigment epithelium (RPE), and a ring of surrounding subretinal fluid are present, enlarging the area of abnormality to about 1000µm.

### Stage Four

Large full thickness macular hole is apparent, with a complete posterior vitreous detachment separating the vitreous from the macular retina and optic nerve.

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Centre for Eye Health is an initiative of  
Guide Dogs NSW/ACT and The University of New South Wales

## spotlight (continued)

In eyes with stage IA and IB impending macular holes, patients usually note metamorphopsia and mild loss of central vision<sup>5</sup>.

This visual loss increases through the transformation to small full thickness and large full thickness holes with visual acuity between 6/24 and 6/60<sup>5</sup>.

Although a central scotoma is present over a full thickness hole, this defect may not always be detectable with conventional visual fields or with an Amsler grid due to the relatively small scotoma size as well as perceptual filling-in of small scotomas during Amsler grid testing<sup>6,7</sup>.

If vitreomacular traction is released in Stage IA or IB holes, the retinal architecture may re-aggregate and resume a near-normal or normal appearance, with no progression to the more advanced stages of macular hole formation.

Lamellar macular holes are another type of macular hole (Figure 5), which can develop through the collapse of a wall of a large macular cystoid space (Figure 6), leaving behind a partial thickness hole<sup>8</sup>.

These generally have less visual obscuration compared with full thickness holes due to fewer retinal layers being disturbed. They can show distortions on the Amsler grid and some reductions in visual acuity (up to 6/24)<sup>9</sup>.

Pseudoholes, as the name implies, are not true holes but mimic them. Pseudoholes can occur in the presence of an epiretinal membrane (Figure 7), with the membrane interrupted across the foveal pit, giving the hole-like appearance<sup>10</sup>.

The underlying retinal architecture is usually distorted in the sense that the foveal pit has vertical walls<sup>10</sup>. Visual acuity is normally not reduced as the photoreceptor layer is intact<sup>9</sup> (see Figure 7) but the patient will likely experience distortions in their vision.

Detection of macular holes, lamellar holes and pseudoholes, and their differential diagnosis, is greatly assisted through the use of optical coherence tomography (OCT).

In practice, fundoscopic examination should be performed with careful examination of the loss of foveal depression, presence of a yellow dot or ring in the foveola and absence of separation of the vitreous from the foveal retina in order to diagnose an impending full thickness macular hole<sup>11</sup>.

Stage 3 and Stage 4 retinal holes are more obvious with round full thickness retinal defects and yellow-white dots within the hole. Unlike full thickness holes, lamellar holes should have less sharp borders, no cuff of subretinal fluid and no RPE alteration.

The natural course of macular holes can be self-limiting at any point of the four stages with varying reports of the progression rates. Treatment generally involves a vitrectomy-based surgery which has the best success rate when performed within three months of diagnosis of the macular hole, particularly when in the later stages<sup>12</sup>.

The American Academy of Ophthalmology (AAO) has published management recommendations for macular holes in ophthalmological practice<sup>13</sup> (Table I). They recommend monitoring Stage IA and IB macular holes every 4 to 6 months in the

Guide Dogs NSW/ACT

### Many of your patients may already need our help.

It's never too early for Guide Dogs NSW/ACT to help someone adapt to life with low vision - especially when all of the training and equipment is provided completely free of charge.

Guide Dogs instructors travel to all parts of NSW/ACT.

### It's easy to refer someone.

With your patient's permission, simply call (02) 9412 9300 or fill in an online referral form at [guidedogs.com.au](http://guidedogs.com.au).

absence of symptoms with immediate re-examination should new symptoms develop.

The AAO guidelines also recommend that Stage 2 macular holes can be managed with either surgery or monitoring at 4 to 8 month intervals, while surgery is recommended for Stage 3 and Stage 4 holes.

Given that macular holes can be bilateral, surgery may be considered earlier in an eye showing early stages of macular hole formation with vitreomacular traction, if the fellow eye has already suffered irreversible vision loss from macular hole formation. If the vitreous is already detached then the risk is significantly reduced.

*This edition prepared by  
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at CFEH. To access previous editions of  
the IMAGE newsletter, or to download  
additional resources for optometrists,  
please visit [www.cfeh.com.au](http://www.cfeh.com.au)*



## References

1. Eye disease case-control study group: risk factors for idiopathic macular holes, *Am J Ophthalmol.* 1994; 118: 754-761
2. Johnson RN, Gass JDM. Idiopathic macular holes: observations, stages of formation, and implication for surgical intervention. *Ophthalmology.* 1988;95:917-924.
3. Atmaca, LS. Follow-up of macular holes, *Ann Ophthalmol.* 1984; 16:1064-1065
4. Luckie A, Heriot W. Macular holes; pathogenesis, natural history and surgical outcomes. *Aust NZ J Ophthalmol.* 1995; 23:93-100
5. Sjaarda RN, Thompson JT. Macular Hole. In *Retina 3rd Edition, volume 3.* Editor C. P. Wilkinson, Mosby, St Louis. 2001; 2547-2561.
6. Schuchard RA. Validity and interpretation of Amsler grid reports. *Arch Ophthalmol.* 1993; 111:776-80.
7. Safran AB, Landis T. Plasticity in the adult visual cortex: implications for the diagnosis of visual field defects and visual rehabilitation. *Curr Opin Ophthalmol.* 1996 Dec;7(6):53-64.
8. Gass JDM. Lamellar macular hole: a complication of cystoid macular edema after cataract extraction – a clinicopathologic case report. *Trans Am Ophthalmol Soc.* 1975; 73: 231-250.
9. Judson PH, Yannuzzi LA. Macular Hole. In *Retina 3rd Edition, volume 2.* Editor Andrew P. Schachat. Mosby, St Louis. 2001; 1182-1209.
10. Haouchine B, Massin P, Tadayoni R, Erginay A, Gaudric A. Diagnosis of macular pseudoholes and lamellar macular holes by optical coherence tomography. *Am J Ophthalmol.* 2004 Nov;138(5):732-9.
11. Gass, JDM. Risk of developing a macular hole. *Arch Ophthalmol* 1991; 109:611
12. Wendel RT, Patel AC, Kelly NE, et al. Vitreous surgery for macular holes. *Ophthalmol.* 1993;100:1671-6
13. American Academy of Ophthalmology. Idiopathic Macular Hole Summary Benchmark - October 2011. <http://one.aao.org>.