Idiopathic Macular Hole: A Teaching Case Report

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Abstract

A macular hole (MH) is an anatomical opening or dehiscence in the fovea. Idiopathic MHs are considered to be a fairly common retinal condition and are most frequently found in healthy women with a normal refractive error in their seventh or eighth decade of life. This teaching case report reviews the important role of the clinician in accurate diagnosis, timely referral for treatment, and continued monitoring of the patient's post-surgical ocular health. It also addresses diagnostic testing, such as optical coherence tomography (OCT), and how it can be implemented for the diagnosis and long-term management of MHs.

Key Words: idiopathic macular hole, optical coherence tomography, pars plana vitrectomy, posterior vitreous detachment, perifoveal posterior vitreous detachment

Background

The following case report involves a 61-year-old Caucasian female who was diagnosed with a full-thickness idiopathic macular hole (MH) in the left eye that was surgically managed. The patient subsequently developed an impending MH in the right eye that resolved without intervention. A MH is a condition in which an anatomical opening or dehiscence develops in the fovea. A full-thickness MH is defined as an anatomical defect in the fovea with interruption of all neural retinal layers from the internal limiting membrane (ILM) to the retinal pigment epithelium (RPE). Though trauma, previous ocular surgery, and other findings may be associated with MHs, the vast majority of MHs are considered idiopathic. Idiopathic MHs are most frequently found in healthy women with a normal refractive error in their seventh or eighth decade of life.

The most common presenting symptoms related to any type of MH are metamorphopsia and blurring of the central vision. The vision loss for a patient diagnosed with a MH can range from mild to as severe as 20/400. Historically, the pathophysiology of MHs was not well understood due to the lack of detailed imaging capability. However, recent advances in retinal and macular imaging have provided additional insight into the pathogenesis and treatment of idiopathic MHs. In particular, optical coherence tomography (OCT) has been useful in diagnosing and characterizing MHs.

This teaching case stresses the important role of the optometrist in accurate diagnosis, timely referral for treatment, and continued monitoring of the patient’s post-surgical ocular health. It highlights diagnostic testing, such as OCT, and how it can be implemented for the diagnosis and long-term management of macular conditions. Additionally, it addresses the need for thorough patient education on management options, including surgical intervention, and the importance of patient compliance with post-surgical instructions. This case can be used as a teaching guide for third- and fourth-year optometry students, as well as optometry residents. There is the potential for this pathology to present in
both an urgent care and a primary care setting. The case could serve as a teaching tool for the review of macular anatomy, particularly in conjunction with utilization of OCT. It can also be used to demonstrate how knowledge learned in the didactic setting can be applied to the diagnosis and accurate classification of a MH in a clinical setting. Finally, fourth-year students and residents can use this teaching case to review proper management and patient education for an eye disease that may need to be addressed with a degree of urgency.

**Student Discussion Guide**

**Case description**

A 61-year-old female presented to the primary eyecare clinic with a complaint of decreased vision. The visual complaints were at distance and near, with and without correction for both eyes. She stated the change in her vision seemed different than the blur she had experienced in the past. This patient had been seen in the primary eye clinic on three previous visits, each time with blur and eyestrain complaints. At the most recent visit a year and a half prior, her vision was best-corrected to 20/20 OD and OS at distance and near with an updated low hyperopic and presbyopic spectacle correction. The patient’s medical history was significant only for hyperthyroidism, for which she had undergone radioactive iodine therapy approximately one year prior. She denied taking any medications. The patient’s allergy history included hypersensitivity to both sulfa and penicillin. Her family ocular history revealed that her father had glaucoma and her mother had keratoconus. The patient’s father also had heart disease and hypercholesterolemia. Visual acuities were measured with habitual correction OD as 20/25 at distance, 20/20 at near, and OS as 20/80 at distance and 20/100 at near. There was no improvement with pinhole OS, and, at this time, the patient noted that all the letters appeared to be jumping OS. Pupils were equal, round and reactive to light with no afferent pupillary defect OD, OS. Extraocular motilities were full and smooth OU. Amsler grid was performed with normal results OD; the patient could only recognize part of the central dot and the lines appeared collapsed centrally and superiorly around the central dot OS. Red cap desaturation was graded as 10/10 OD and OS. The patient’s current glasses were approximately two years old, and the refraction at this visit showed a minimal change OD to increase the vision to 20/20 at distance and no change OS with no improvement of vision. Her keratometry readings were stable from previous readings with measurements of 43.50/43.00 @ 090 OD and 43.75/43.75 @ 090 OS.

Anterior segment evaluation revealed normal findings OU. However, the patient’s angles were evaluated as a Van Herick grade 1 temporal and grade 2 nasal OD, and grade 1 temporal and grade 2 nasal OS. Goldmann tonometry results were 16 mmHg OD and 15 mmHg OS. Gonioscopy was performed with ciliary body visible in all four quadrants OD and OS along with trace pigment 360 degrees OD and OS. Dilated fundus examination revealed healthy, well-perfused optic nerves with cup-to-disc ratios of 0.25/0.25 OD and 0.25/0.25 OS. There was no posterior vitreous detachment (PVD) in either eye. The macula OD was flat and clear with a positive foveal reflex. The macula OS was abnormal with the appearance of a small, discrete, red-colored circular defect centered in the fovea. (Figure 1) An OCT was performed OD and OS at this time. (Figure 2) The blood ves-
sels and background were normal OU with the retina being flat and clear 360° to the ora OD and OS.

**Educator’s Guide**

The educator’s guide contains additional patient exam evaluations, a review of the literature and discussion points to help facilitate the thoughtful discussion of the case. There is also an overview of the disease process and important factors aimed at the primary eyecare provider.

**Learning Objectives**

At the conclusion of this case discussion, participants should be able to:

1. Be familiar with the signs and symptoms of macular holes.
2. Be knowledgeable regarding the differential diagnosis of macular holes.
3. Understand the typical patient demographics of the disease profile.
4. Understand the morphological process that leads to macular hole formation.
5. Provide patient education regarding management options and appropriate patient expectations for chosen treatment.
6. Appropriately co-manage with retinal ophthalmology for surgical management and follow-up.
7. Be able to educate the patient on potential secondary manifestations of surgical treatment and on risk of macular hole in the other eye.

**Key Concepts**

1. Recognition of clinical findings with macular holes and the appropriate tests to perform.
2. The use of technology in aiding with diagnosis and prognosis of macular holes.
3. The importance of patient education regarding the condition, treatment options, post-surgical considerations, and possible sequelae.
4. Recognition of post-treatment management of patients with this condition.

**Discussion Questions**

1. Knowledge, concepts, facts and information required for critical review of the case
   a. Which examination tests can help to refine and confirm the diagnosis?
      i. Entrance tests
      ii. Ocular health exam
      iii. Supplemental tests
   b. Does this patient fit the typical demographic for her suspected diagnosis?
   c. Based on the OCT results, how would you grade the stage of her condition?
      i. Can some stages of this condition be monitored?
      ii. How do you know when treatment is indicated?
   2. Differential diagnosis
      a. What is your differential diagnosis:
         i. After the case history alone?
         ii. After entrance tests and refraction?
         iii. After ocular health examination?
   b. Aside from an OCT, what tests could you perform to narrow down your differential list?
   3. Patient management
      a. What treatment, if any, would you recommend to this patient?
      b. Based upon the stage of her condition, how quickly should the patient undergo treatment?
      c. At what point after symptoms present is treatment no longer recommended, as a successful outcome is unlikely?
      d. How would you manage this patient after successful treatment?
   4. Communication with the patient regarding diagnosis, prognosis, treatment options, and potential sequelae of treatment
      a. How would you educate this patient regarding her diagnosis and prognosis?
      b. What is the risk of the fellow eye developing the same condition?
      c. What aspects of treatment may be difficult for the patient?
      d. What potential post-treatment sequelae should you educate the patient about?

**Additional Evaluation and Follow-Up**

The retinal specialist concurred with the diagnosis of stage 3 MH in the left eye and recommended surgical intervention in the form of pars plana vitrectomy with a membrane peel and a gas bubble with post-surgical face-down positioning (FDP). The surgery was successfully performed OS one month after initial presentation. The patient reported compliance with face-down positioning for two weeks post-surgery. Her post-surgical vision OS was 20/30. Over the course of the next six months, the patient developed a cataract OS and underwent cataract surgery.

Approximately two weeks after cataract surgery OS, the patient returned to the eye clinic complaining that she could not see as well after the cataract surgery as she felt she should. Her entering visual acuities were 20/70 OD and 20/30 OS at distance. All entrance testing was normal OD and OS. A refraction was performed that enabled the patient to see 20/40 OD and 20/30 OS. The patient’s anterior segment exam was unchanged from the original visit with the exception of a grade 4 Van Herick angle, 2+ cells in the anterior chamber and a posterior chamber intraocular lens, all OS. She reported taking prednisolone acetate 1% ophthalmic suspension three times per day OS as instructed after cataract surgery. A fundus evaluation OD revealed a foveolar yellow spot and the absence of a PVD. An OCT was performed OD showing a cystic-like space of the inner retina and the presence of a stage 1A MH was confirmed. (Figure 3) The patient was told that surgery was not yet indicated and that she should follow up every month for serial OCTs to monitor the OD for change. The patient returned one month later and the OCT revealed that the posterior hyaloid OD had detached from the macula, the stage 1A
MH had resolved, and her vision improved to 20/20.

**Literature Review**

**Epidemiology**

Idiopathic MHs are considered to be a fairly common age-related retinal condition. Though the epidemiologic data is limited, a recent study in the United States reported that idiopathic MHs affect 7.8 people per 100,000 population per year. Studies have consistently found that idiopathic MHs affect women more often than men, and the increased risk for women has long been recognized. Higher age and a history of cataract surgery are also significantly associated with an increased prevalence of MHs. MHs are most often unilateral; however, the incidence of fellow eye involvement for any stage of MHs has been reported to vary from 11.7% to 19%.

**Pathophysiology and classification**

The pathogenesis of idiopathic MHs is not completely understood. Historically, various theories regarding the etiology have been debated. MHs were originally thought to form secondary to trauma, but clinical and histopathologic studies in the 1960s observed the forces of the vitreous on the macula, leading to the theory that vitreomacular traction played a role in idiopathic MH formation. The exact nature of the tractional force was unknown, but Gass proposed a theory of tangential vitreous traction that was initially widely accepted. More recently, the adherence of the posterior hyaloid to the foveal center during early MH formation was demonstrated, indicating the potential for the exertion of anteroposterior traction.

Idiopathic MHs are described according to a classification scheme that characterizes the evolution of an idiopathic MH into systematic clinical stages. Though Gass’ classification is still most commonly used by clinicians to describe the clinical staging for MHs, Gass’ original theory has been reconsidered. Research and technological advances in retinal imaging have led to a better understanding of the pathogenesis of an idiopathic MH. OCT is one such technology that has helped to elucidate the role of the vitrefoveal interface in idiopathic MH formation. See Table 1 to correlate Gass’ stages of development with the corresponding OCT appearance. Recently, the International Vitreomacular Tract Study (IVTS) Group developed a new classification system based on anatomic characteristics of disease of the vitreomacular interface (VMI) using OCT. They describe vitreomacular adhesion (VMA) that correlates to a

### Table 1

**Classification and Characteristics of Idiopathic Macular Holes**

<table>
<thead>
<tr>
<th>Stage of Development</th>
<th>Visual Acuity</th>
<th>Biomicroscopic Appearance</th>
<th>OCT Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1A</td>
<td>20/20 to 20/60</td>
<td>Central yellow spot</td>
<td>Foveal pseudocyst or split in the inner retinal layer associated with a perifoveal posterior vitreous detachment (PPVD)</td>
</tr>
<tr>
<td>Stage 1B</td>
<td>20/20 to 20/60</td>
<td>Yellow ring</td>
<td>Progression of the foveal pseudocyst with disruption of the outer retinal layer and a PPVD, the roof of the pseudocyst remains intact</td>
</tr>
<tr>
<td>Stage 2</td>
<td>20/40 to 20/100</td>
<td>Round or oval full-thickness macular hole &lt;400 microns</td>
<td>Full-thickness macular hole with or without operculum, posterior hyaloid may be incompletely detached from hole edge, vitreopapillary adhesion</td>
</tr>
<tr>
<td>Stage 3</td>
<td>20/60 to 20/200</td>
<td>Round full-thickness macular hole &gt;400 microns</td>
<td>Full-thickness macular hole with or without operculum, complete posterior hyaloid detachment over macula, vitreopapillary adhesion</td>
</tr>
<tr>
<td>Stage 4</td>
<td>20/60 to 20/400</td>
<td>Round full-thickness macular hole &gt;400 microns, Weiss ring</td>
<td>Full-thickness macular hole, complete posterior vitreous detachment</td>
</tr>
</tbody>
</table>

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Figure 3

*Macular OCT images of the right (a) and left (b) eye after surgical repair of a macular hole in the left eye and with a new macular hole in the right eye.*
Stage 0 macular hole. On OCT evaluation this entity shows a partial detachment of the vitreous in the perifoveal area without any retinal abnormality. Patients in this stage have no visual symptoms, and the vitreous may separate spontaneously without incident. VMA can be classified as focal (≤ 1500 μm) or broad.

OCT examination provides a detailed picture of a perifoveal posterior vitreous detachment (PPVD), where the posterior hyaloid detaches around the macula but a focal vitreofoveal attachment remains. A prospective study by Haouchine et al., which utilized both clinical and OCT examinations, demonstrated that a foveal pseudocyst may be the initial feature in an eye with a MH, and the pseudocyst is always found in conjunction with a PPVD on OCT. The same study found that a stage 1A MH corresponds with OCT findings of a pseudocyst that occupies the inner fovea, while in a stage 1B MH the pseudocyst extends posteriorly and disrupts the outer retinal layers at the fovea. The IVTS Group defines vitreomacular traction (VMT) as detectable retinal anatomic change on OCT with concurrent PPVD, but with remaining vitreous attachment within 3 mm of the fovea. VMT correlates to a Stage 1 macular hole, and it appears on OCT as a change in the contour of the foveal surface, intraretinal pseudocyst, or elevation of the fovea from the RPE. Like VMA, VMT can also be classified as focal (≤ 1500 μm) or broad.

When VMT persists and causes the roof of the cyst to open, it is classified as a stage 2 full-thickness MH. In a stage 2 MH, the posterior hyaloid remains attached to the roof of the cyst or the incompletely detached operculum, which is still continuous with the inner retina. Rarely, the roof of the foveal pseudocyst opens while the photoreceptor layer, or outer retinal layer, remains intact; this is referred to as a lamellar, or partial-thickness MH. A stage 3 MH occurs when the posterior hyaloid is no longer attached to the hole’s edges, and this has been demonstrated on OCT with complete separation of the posterior hyaloid from the retina throughout the posterior pole, except at the optic disc. A stage 4 MH results when the vitreous is completely separated from both the entire macular surface and the optic disc (i.e., a PVD is present). Takahashi et al. confirmed the absence of the posterior hyaloid membrane with OCT in all eyes studied with stage 4 MHs.

The IVTS classification subdivides full-thickness MHs by size, using spectral domain OCT to measure the aperture size at the hole’s narrowest point. A small hole is measured as less than 250 μm, a medium hole between 250 and 400 μm, and large as greater than 400 μm. MHs are also classified as having or not having concurrent VMT. Furthermore, MHs are classified as being primary or secondary. Idiopathic MHs are referred to as primary in the IVTS classification.

Natural history and treatment
Stage 1A and 1B MHs may initially go unnoticed in the primary eye if the fellow eye is normal. A stage 1A or 1B MH can spontaneously close, remain stable, or continue to progress into a full-thickness MH. Gass found that approximately 45% of patients who presented with a stage 1A or 1B MH experienced a spontaneous vitreofoveal detachment, which resulted in release of traction and improvement of acuity to near normal levels. The Vitrectomy for Prevention of Macular Hole Study (VPMHS) Group explored the question of whether surgical intervention to relieve VMT would stop the progression of an impending MH (stage 1A or 1B) to a full-thickness MH. The authors of this study concluded that the benefit from vitrectomy for either type of stage 1 MH was minimal and was unlikely to outweigh the surgical risks and cost, thus a conservative approach was recommended for stage 1A and 1B MHs. Stage 1A and 1B idiopathic MHs have been characterized as “transient,” and Gass noted that most of these holes either progress or had a spontaneous vitreofoveal separation within several weeks or months. The VPMHS Group found the progression time from a stage 1A or 1B hole to a full-thickness MH to be an average of 4.1 months. Haouchine et al. demonstrated that stage 1A MHs may remain unchanged for up to 26 months.

Recently, a nonsurgical option in the form of a pharmacolytic agent, called ocriplasmin, has been made available as an option for intervention to release VMT. Ocriplasmin is “a recombinant human serine protease plasmin with proteolytic activity against the protein components of the vitreous and vitreo-retinal interface,” which facilitates vitreous liquefaction and, thus, separation of vitreous from the retina. The efficacy of ocriplasmin was explored in two phase III clinical trials, which demonstrated that a greater proportion of patients treated with intravitreal ocriplasmin achieved resolution of VMT (26.5%) at 28 days than those treated with placebo (10.1%). This same study achieved nonsurgical closure of MH with VMT in 40.6% of eyes treated with ocriplasmin, as compared to 10.6% of placebo treated eyes. According to the IVTS Group, MHs with VMT are considered for pharmacologic vitreolysis, with small holes (less than 250 μm) being the most responsive. MHs without VMT are not candidates for treatment with ocriplasmin. Ongoing studies continue to explore the use of ocriplasmin for VMT with MH. The role of ocriplasmin for clinical use is still being determined as more specific indications are established.

Stage 2 MHs are very likely to progress to stage 3 or 4 when left untreated, though they can stabilize. Kim et al. showed that 74% of stage 2 holes in their observation group progressed to stage 3 or 4 holes within a year. Another small study found that all of the 15 eyes with stage 2 MHs that were being observed progressed to stage 3 or 4 MHs. The Vitrectomy for Macular Hole Study demonstrated that surgical intervention in stage 2 MHs was associated with a much lower incidence of hole enlargement and a better outcome in visual acuity as compared with observation alone. Therefore, strong consideration for surgical therapy is suggested in stage 2 MHs.

Long-term observation of stage 3 and stage 4 MHs demonstrates they are very unlikely to close spontaneously. Observation of 22 stage 3 MHs revealed that 36% remained at stage 3 and 67% were stage 4 at a five-year follow-up. In fact, progression of the size and stage of full-thickness MHs without surgical intervention is likely to occur until vision stabilizes at the level of 20/200 or
The RPE through a toxic or phototoxic mechanism. New dyes continue to be explored. Trypan blue has demonstrated better visual recovery and a lower rate of persistent scotoma than ICG. Face-down posturing of the patient has long been a part of postoperative management for MH repair. However, it is difficult for many patients, especially the elderly and those with physical and other limitations, to maintain this prone positioning. Recently, the necessity and duration of FDP has been called into question. Good functional and anatomical results have been demonstrated without FDP when the vitreous cavity is completely filled with a gas bubble. Silicone oil is currently used as an alternative method of tamponade for those who cannot maintain FDP. However, this does require a second surgery to remove the oil, and a few droplets may remain in the vitreous cavity, which can be detected by patients as small floaters. Though some feel that MH surgery may eventually advance toward the elimination of FDP, many surgeons continue to feel that, until evidence proves otherwise, one to two weeks of FDP are still important for a predictive and successful outcome of MH surgery.

Discussion

This section focuses on different aspects of the patient’s examination in order to highlight various discussion points. The discussion moves through the exam step by step, following the clinical thought process throughout.

The patient’s case history was very broad and did not help to narrow down the differential diagnosis list. A blurry vision complaint would most likely lead a clinician to initially consider a refractive etiology. No improvement with pinhole indicates that a refractive cause would be unlikely as the cause of decrease in vision. This was eventually confirmed when refraction did not improve the vision in the left eye. Routine entrance testing includes some basic neurological tests that help to further narrow down this patient’s diagnosis. Normal pupils suggest that there is unlikely to be any type of optic nerve disease, and this was reaffirmed by the normal results of the red cap desaturation test. The patient had a significant family ocular history, including keratoconus in her mother and glaucoma in her father. Her keratometry readings were within a normal range and the patient was well past the typical age of onset for keratoconus. Additionally, the onset of vision loss and symptoms from keratoconus would not likely occur in such a short time frame, as this patient had normal vision at her exam 18 months prior. Furthermore, the slit lamp exam revealed that the media was clear and the cornea was free of scarring, striae or thinning. Only mild nuclear sclerotic changes were present in the lens. The need to rule out glaucoma arose from the patient’s positive family history and her own anatomical narrow angles. Her confrontation visual fields were normal, gonioscopy revealed no signs of angle closure, average intraocular pressures were measured, and the patient reported no eye pain. Therefore, vision loss from acute angle-closure glaucoma was ruled out. The Amsler grid was the most useful test performed before dilation that hints at a macular etiology.

Careful dilated fundus examination quickly revealed a macular cause for this patient’s decrease in acuity. The macular lesion observed had to be differentiated from other foveal and macular lesions including an epiretinal membrane with pseudohole, lamellar MH, solar retinopathy, macular degeneration and chronic cystoid macular edema with a prominent central cyst. Diagnostic accuracy with a MH is extremely important in order to avoid incorrect or unnecessary surgery. The Watzke-Allen test is a quick test performed behind the biomicroscope with a fundus lens and can be easily utilized in a clinical setting. The test is performed by using a biomicroscope lens (e.g., 78D or 90D lens) and projecting a very narrow vertical slit beam of light onto the fovea directly over the area of suspected MH. The patient is asked to describe the beam of light and specifically if the beam is regular in outline or if it is distorted in any way. Most patients with a large full-thickness MH report a break or gap in some part of the central portion of the line. Patients who describe bowing, pinching or a discontinuous slit beam are more likely to have small macular cysts or other macular lesions.
lesions. The Watzke-Allen test was performed when this patient initially presented with decreased vision and she reported a significant narrowing of the light beam in the center, but denied a total break in the light beam. The lack of a complete break in the slit beam is potentially due to the light beam not being placed directly over the center of the hole, or the width of the slit beam used not being larger than the actual hole. In this case, the light beam would appear narrowed as opposed to broken. The false negative result of this test re-inforces the benefit of objective testing (e.g., OCT) over subjective testing.

The advent of OCT has produced a whole new perspective on examining the retina in vivo with high resolution cross-sectional images. OCT details the retinal layers and their pathology, which has allowed for insights into the pathogenesis of macular disease. A 1995 study, conducted shortly after OCT was introduced, concluded that OCT is a useful and noninvasive diagnostic technique for visualizing MHs and distinguishing them from partial thickness MHs, macular pseudoholes and cysts. The diagnosis and staging of a MH is one instance in particular where OCT becomes invaluable. It is essential to differentiate a full-thickness hole from a pseudohole or other lesion in order to determine the appropriate treatment. An optometrist should be prepared to make this distinction by interpreting the results of OCT. This patient was a perfect example of a case that prior to OCT would have been a judgment call, and the choice may have been made erroneously to monitor for progression. If the hole eventually progressed and surgery was performed in a more delayed time frame, it could have resulted in poorer post-surgical vision. Additionally, this case demonstrates how OCT was used to evaluate the patient’s fellow eye and monitor macular changes that were not clearly evident with biomicroscopy. Ultimately, the OCT allows for a quantitative characterization of macular holes.

Other questions to consider in this case include what stage MH did the patient initially present with in the left eye, how long had the MH existed at the time of the patient’s presentation, and how would these two factors affect the potential surgical outcome of this case? The OCT provided direct evidence of a full-thickness defect in the macula. (Figure 2) The patient’s best-corrected visual acuity upon initial presentation with the MH was 20/80, which falls into the typical range for either a stage 2 or stage 3 MH. The posterior hyaloid appears to be completely detached from the fovea in the OCT, thus there is evidence that the patient’s full-thickness MH would be classified as stage 3. There was no PVD evident on the patient’s fundus evaluation when she presented with the MH, so a stage 4 MH in the left eye is ruled out. There is no way to know exactly how long the macular hole existed prior to examination. The patient had received a comprehensive eye exam a year and a half prior and there were no signs of a macular hole. The patient was unsure of the duration of the decrease in vision, but she estimated the onset was approximately two months prior. A study by Kang, et al. suggests that once a full-thickness nevoretinal defect occurs (stage 2), MH repair surgery should be performed as early as possible. The same study found that better preoperative acuities and smaller diameter holes result in more favorable surgical outcomes. This study also noted a trend for a better surgical outcome in holes that existed for a shorter preoperative length of time. Another study concluded that stage 2 MHs would benefit most from surgical intervention because these patients have more vision to lose than those with stage 3 and 4 MHs.

An interesting aspect of this patient’s case was the bilaterality of her MHs. Aaberg, et al. reported that 17% of MHs were bilateral, but noted their study outcome may be high because it took place at a referral center. A more recent study that looked at bilaterality of MHs in normal fellow eyes initially without a PVD found an incidence of 7.5% at 18 months and 15.6% at five years. The patient’s OCT scan of the right eye at initial presentation displays an intact macula with evidence of a PPVD and VMA. (Figure 2) Approximately six months post-repair OS, the patient presented with new symptoms and the appearance of a foveolar yellow spot OD. The OCT OD showed intraretinal foveal splits and a small foveal detachment beneath the central fovea; however, the inner layer breaks had not completely progressed to the outer layer yet, classifying it as a stage 1A MH. (Figure 3) The best-corrected VA OD at this time was 20/40, which puts her at lower risk for developing a full-thickness MH according to the VPMHS. The reported delay in bilateral involvement averages 19 months, which makes a strong case for close monitoring and long-term follow-up. This patient’s fellow eye presented with a stage 1A MH approximately seven months after the initial eye presented with a full-thickness MH. It resolved spontaneously after one month.

Patient education is essential throughout the duration of the diagnosis, referral, surgical, and follow-up period for a MH patient. A thorough explanation of what a macular hole is and the options for management based upon evidence-based medicine should be presented to the patient. This is the responsibility of the diagnosing and referring doctor, thus will often fall on the shoulders of an optometrist. Since it has been reported that a shorter preoperative duration of the MH achieves higher rates of better post-surgical vision, the diagnosing doctor plays an important role in facilitating a timely referral and making sure the patient understands why time is of the essence. The patient should be acquainted with the basics of the post-surgical regimen; however, it is recognized that this is highly dependent on the surgeon and specifics of each individual’s case. It is appropriate to advise the patient on the possibility of FDP and provide him or her with resources in order to assist him or her in accomplishing this successfully, should it become necessary. Finally, the patient should be made aware that the occurrence of nuclear sclerotic cataract after vitrectomy is common, and it may have a negative effect on visual outcome. Therefore, it is likely that an additional surgery will be necessary to address this secondary complication. However, if the MH surgery was initially successful, the visual prognosis once the cataract is removed is excellent.

Conclusions
This teaching case report discusses the diagnosis and management of a full-thickness idiopathic MH from the per-
References


