Hole in One: A Case of a Full-Thickness Macular Hole
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Abstract
A 75-year-old Hispanic male presents with gradual decreased vision in his right eye for over one year. Clinical examination and OCT testing reveal a full-thickness macular hole with adjacent edema in the right eye that was later treated with a pneumatic vitreolysis and pars plana vitrectomy.

Case History
Patient Demographics: 75-year-old Hispanic Male

Chief Complaint: Patient reports having decreased vision in his right eye ever since having cataract surgery in 2018, and his vision in the right eye has gotten progressively worse in the past year.

Ocular History:
• CEIOL OS 10/2/18, OD 10/25/18
Medical History:
• Hypertension
Family Ocular History
• Within normal limits

Pertinent Findings
Pupils: PERRL – RAPD
VA cc: OD 20/100, OS 20/20
BCVA: 20/50-1 OD, 20/20 OS
Anterior Segment: Unremarkable OU
IOP: 18/17 mmHg OU GAT
Optic Nerve: OD 0.35 h/v, flat, pink, and distinct
OS 0.35 h/v, flat, pink, and distinct
Macula: OD round hole with surrounding edema
OS flat and normal pigment, foveal reflex present
Posterior Pole/Vitreous/Periphery: Unremarkable OU

Differential Diagnosis
• Full-thickness macular hole
• Macular pucker with pseudohole
• Lamellar hole
• Intraretinal cysts with chronic cystoid macular edema
• Solar retinopathy

Diagnosis and Discussion
Macular holes are classified as full-thickness defects in the neural retina, specifically in the fovea. Data suggests that the cause of macular holes stems from abnormal traction of the vitreous on the macula. Most full-thickness macular holes are idiopathic, however some form after blunt ocular trauma. Macular holes occur in about 1 in 500 patients and most commonly affect people in their sixth or seventh decade of life, with women more affected by men by a 2:1 ratio.

Ocular symptoms:
Central scotoma, decreased vision, metamorphopsia.
Usually unilateral but can occur bilaterally.

Ancillary Testing:
• OCT will show a full thickness loss of tissue
• Fluorescein angiography will show early hyperfluorescense without leakage

Classification of Macular Holes
GASS vs International Vitreomacular Traction Study

<table>
<thead>
<tr>
<th>Stage</th>
<th>GASS</th>
<th>IVTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>VMA</td>
<td>VMA</td>
</tr>
<tr>
<td>1</td>
<td>Impending macular hole</td>
<td>VMT</td>
</tr>
<tr>
<td>2</td>
<td>Full-thickness macular hole ≤400μm</td>
<td>Full-thickness macular hole</td>
</tr>
<tr>
<td>3</td>
<td>Full-thickness macular hole &gt;400μm</td>
<td>Lamellar hole</td>
</tr>
<tr>
<td>4</td>
<td>Full-thickness macular hole &gt;400μm with complete PVD</td>
<td>Pseudohole</td>
</tr>
</tbody>
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Image 1 and 2: en-face images of the patient’s right and left eye
Image 3 and 4: OCT OD, OS, respectively at initial visit
Image 5: OCT OD 1 week post PPV with membrane peel

Treatment and Management
Initial Treatment:
• Stage 0/ VMA: monitor
• Stage 1/VMT can be monitored due to 50% chance of spontaneous resolution—Amroller grid
• For symptomatic VMT or full-thickness holes with VMT, medical therapy can be considered
  • Pharmacologic vitreolysis
  • Serine protease that separates the hyaloid from the underlying retina
  • Macular hole MUST have VMT
  • Steeper edge of adhesion has better response
  • Many adverse effects, not commonly used today

Current Standard of Treatment:
• Pars plana vitrectomy (PPV), combined with internal limiting membrane peeling (ILMP), and intravitreal gas tamponade is the standard treatment for FTMs.
• The treatment can also be used for any macular hole with epiretinal membranes or with VMT > 400μm. Visual acuity does not always improve immediately and is dependent on pre-operative characteristics and the duration of the macular hole.
• Intravitreal gas/air bubble is an intraocular stent used to maintain juxtaposition of the retina to the RPE. Research reports some success rates as high as 83% for FTMH closure.

Other Treatment Options:
• Autologous retinal transplants are used when macular holes do not respond to PPVs with ILM peeling. A free flap of retina is harvested and placed over the macular hole as a “plug” and a scaffold for glial cell proliferation.

Patient Status:
• The patient underwent a pars plana vitrectomy with ILM peel and intravitreal gas bubble. Vision was 20/400-1 OD 1-week post-op and is currently being monitored for further improvement.

Conclusion
In general, better vision preoperatively > better vision postoperatively
• Studies show that treated holes with preoperative vision of 20/50 or better have greater chance of gaining 3 to 4 lines of vision after treatment
• Chronic or large holes will have worse visual prognosis.
• A small number of macular holes can reoccur after a successful initial surgery
• There is a 10-15% risk of a patient with a FTMH in one eye developing a FTMH in the fellow eye in five years.
• The risk is around 1% or less in the fellow eye if posterior vitreous detachment (PVD) is present

PPV and ILM peeling remain the standard treatment for FTMH, although vitreolysis and autologous retinal transplants are options
• Diseases of the vitreomacular interface need to be monitored closely to address macular hole formation earlier rather than later.
• Amroller grid is a useful tool for patients to monitor changes at home.

Patient education is key: vision may not be improved, and patients must have realistic visual expectations and outcomes.

Bibliography