

SD-OCT–Guided Macular Hole Surgery

Preoperative imaging may help surgeons gauge the benefits and risks of internal limiting membrane peeling.

BY STEVEN M. COHEN, MD

Pars plana vitrectomy for patients with macular hole has advanced since it was first described by Kelly and Wendell.¹ Thanks largely to earlier surgical intervention, macular hole closure rates have climbed from 58% in their original cohort to more than 90% today.^{1,2} As in the original description, macular hole surgery involves 2 key steps: pars plana vitrectomy with surgically induced posterior vitreous separation and macular hole tamponade with intra-ocular gas.

Internal limiting membrane (ILM) peel is an additional step in macular hole surgery that has been widely adopted by vitreoretinal surgeons. Many surgeons advocate the use of adjuvant stains to visualize the ILM.² Other than the posterior hyaloid, the ILM is the only removable structure that can exert sufficient traction on the retinal surface to hinder macular hole closure. The advantage of ILM peeling is that it increases the rate of macular hole closure.²⁻⁴ The disadvantage is that it increases the morbidity of the procedure.

ILM peeling can cause damage to the retina from vital dyes used at the time of surgery, mechanical damage to the retina from trauma during ILM peeling, and photic damage to the retina because of prolonged operating times.⁵⁻⁷

Spectral domain optical coherence tomography (SD-OCT) scanners are now widely available. Preoperative OCT scanning has been used to measure macular hole size and thereby guide postoperative

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positioning and predict possible surgical success.^{8,9} In addition to measuring macular hole width, SD-OCT scanners can image the ILM.

With their high resolution of macular anatomy, preoperative SD-OCT scans may provide information about macular holes that could help a surgeon gauge the potential benefit of performing ILM peel.

This article presents 2 cases of macular hole with strikingly different preoperative SD-OCT images. Both macular holes were small and still had vitreous adherent to the edge of the macular hole. Both macular holes also closed after a single 23-gauge pars plana vitrectomy with 25 percent SF₆ gas and 1 week face-down positioning. In the first case, the preoperative SD-OCT showed no distinct ILM (Figure 1). In that case, I did not peel the ILM. In the second case, the preoperative SD-OCT shows a thickened ILM attached to rolled edges of the macular hole (Figure 2). In the second case, I peeled the ILM without staining.

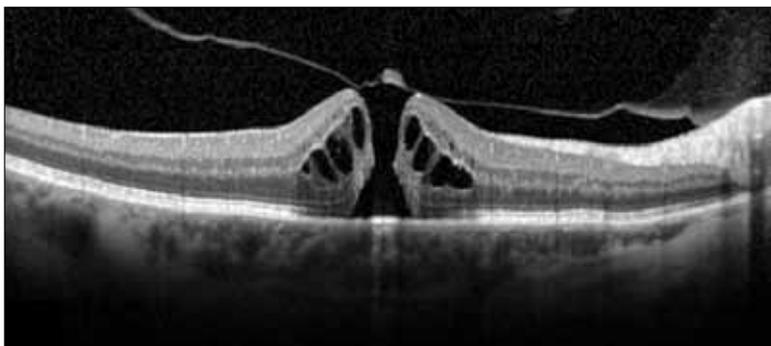


Figure 1. Case 1: SD-OCT scan showing stage 2 macular hole with a diameter of 250 μm . The scan shows no thickening of the ILM.

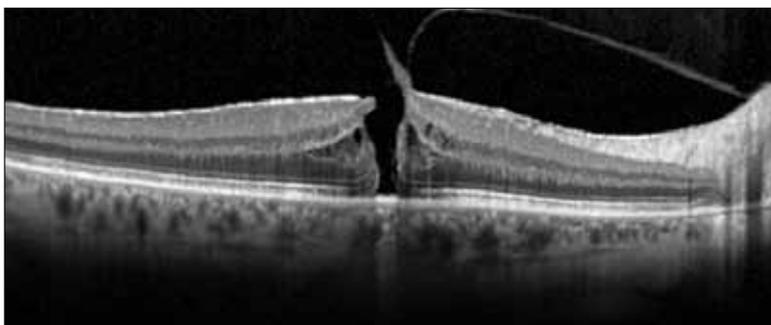


Figure 2. Case 2: SD-OCT scan showing stage 2 macular hole. The scan shows thickening of the ILM, which is visibly distorting the retinal surface.

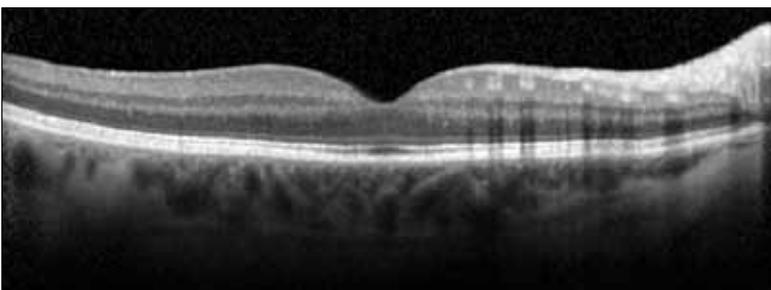


Figure 3. Case 1: SD-OCT scan showing 2 months after surgery. The macular hole is closed and the vision has improved. The ILM was not peeled, and the fovea has a smooth even contour.

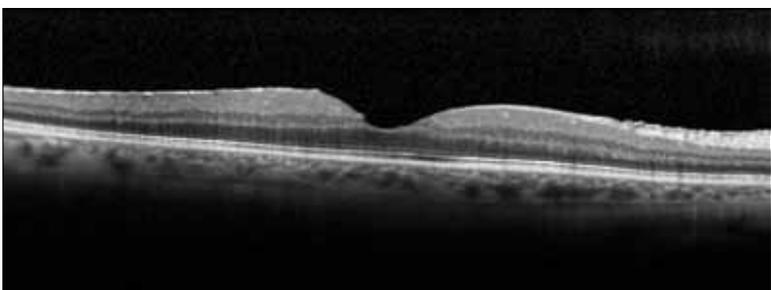


Figure 4. Case 2: SD-OCT scan showing 2 months after surgery. The macular hole is closed and the vision has improved. The fovea has a slightly irregular contour where the ILM was peeled.

CASE 1: STAGE 2 MACULAR HOLE, NO VISIBLE ILM

A woman aged 72 years presented with decreasing vision in her right eye (OD) for 1 month. She was diagnosed with a macular hole and referred for possible surgery. Visual acuity was 20/125 OD and 20/25 in the left (OS). SD-OCT showed stage 2 macular hole OD with a diameter of 250 μm . The patient was eager for surgery and was operated on within 1 week. She underwent vitrectomy without ILM peeling and 25% SF₆ gas and 1-week facedown positioning (see Video [QR code]). Two months following surgery, the macular hole was closed and vision had improved to 20/32 (Figure 3).



CASE 2: STAGE 2 MACULAR HOLE, VISIBLE ILM

A man aged 63 years presented with a stage 1 macular hole and visual acuity of 20/30. One month later the vision had worsened to 20/60. The macular hole had progressed from a stage 1 partial thickness macular hole to a stage 2 full-thickness macular hole (Figure 2).



Because of the thickened ILM on the preoperative SD-OCT, the patient underwent 23-gauge pars plana vitrectomy with ILM peeling without adjuvant stain, 25% SF₆ gas and 1-week face-down positioning (see Video [QR code]). Two months following surgery, the macular hole was closed and vision had improved to 20/40 (Figure 4).

DISCUSSION

A surgical maneuver that confers no benefit to a patient is not worth performing. ILM peeling can damage the retina: Some patients who have had an ILM peel experience damage to the macula from direct surgical trauma, photic

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macular damage, and cellular damage from vital dyes.^{2,5}

On the other hand, overall success rates for macular hole surgery are higher, between 90% and 100%, in cases in which the ILM is peeled. Based on randomized studies, there are probably about 10% of patients who need to have their ILM peeled to effect macular hole closure.²

It is straightforward to identify these patients in retrospect. Patients whose macular hole does not close following pars plana vitrectomy without ILM peeling most likely would have benefitted had ILM peeling been performed initially. It would be better, however, to have a way to prospectively identify macular hole patients who would likely benefit from ILM peeling. The 2 cases reported in this article had substantially different foveal anatomy on preoperative SD-OCT scans. It is possible that information from preoperative SD-OCT on macular anatomy might be helpful to guide macular hole surgery, although this concept should be validated by prospective studies. ■

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