SMILEY-SHAPED POSTERIOR RETINOTOMY FOR LARGE SMH

This surgical alternative is useful for thick and organized hemorrhages.

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A large, submacular hemorrhage (SMH) is a vision-threatening condition commonly associated with wet AMD, although it may also arise from polypoidal choroidal vasculopathy, myopic choroidal neovascularization, retinal arterial macroaneurysm, trauma, inflammatory choroidal neovascular membranes, or idiopathic causes (Figures 1-4). Experimental studies have demonstrated that rapid photoreceptor injury can occur from subretinal blood due to iron toxicity, mechanical disruption, and impaired metabolic exchange.[1,2]

Although pneumatic displacement with intravitreal tissue plasminogen activator (tPA) and expansile gas is the most widely used treatment, with select cases also benefiting from subretinal tPA administration to facilitate more direct clot lysis and displacement, outcomes may be suboptimal for large, thick, and/or organized hemorrhages.[3-7]

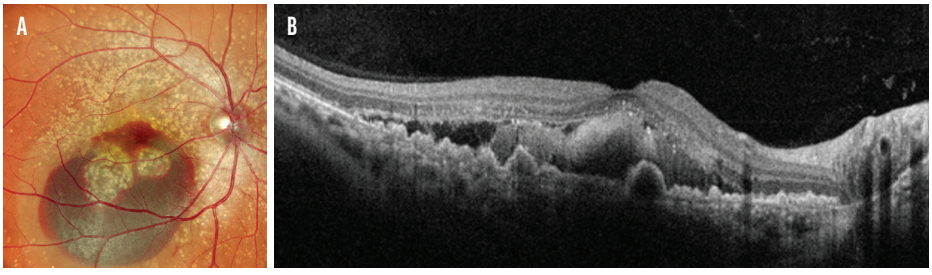

Figure 1. Preoperative fundus photography showed confluent drusen at the posterior pole consistent with Doyne honeycomb dystrophy and a medium-sized subretinal hemorrhage due to active macular neovascularization (A). OCT imaging showed drusenoid pigment epithelial detachments with subretinal fluid and subretinal hyperreflective material, consistent with hemorrhage (B).

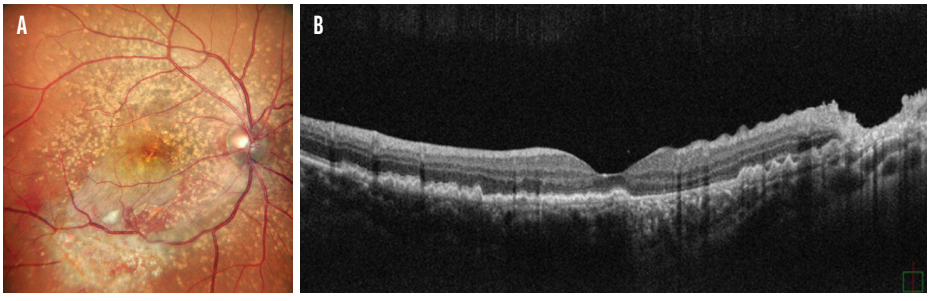

Figure 2. Postoperative fundus photography demonstrated a smiley-shaped posterior retinotomy placed at the area of maximal clot thickness and away from the fovea, with associated subretinal fibrosis (A). OCT imaging demonstrated complete resolution of subretinal fluid with restoration of foveal contour and focal nasal disruption of the ellipsoid zone (B).

We describe a modified curved ("smiley-shaped") posterior retinotomy technique for direct clot evacuation and report 6-month anatomical and functional outcomes in a consecutive case series of 11 eyes with large SMH (Table).

SURGICAL TECHNIQUE

All eyes underwent standard pars plana vitrectomy. Triamcinolone acetonide was used to facilitate and confirm posterior vitreous detachment. Following core and peripheral vitrectomy, a curved posterior retinotomy was fashioned adjacent to the hemorrhage in an area of maximal clot thickness and away from the fovea, allowing controlled access to the subretinal space without direct foveal manipulation.

The vitrectomy cutter was gently introduced through the retinotomy, and the submacular clot was engaged under high vacuum and carefully aspirated. Infusion pressure was transiently elevated to 60 mm Hg during clot evacuation to

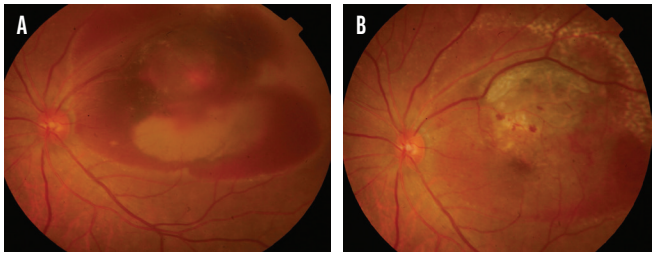

Figure 3. Preoperative fundus photography demonstrated a large subretinal hemorrhage consistent with idiopathic polypoidal choroidal vasculopathy (A). The postoperative fundus photograph demonstrated complete evacuation of the subretinal hemorrhage via smiley-shaped retinotomy with surrounding laser photocoagulation marks and adjacent fibrosis (B).

reduce intraoperative bleeding and subsequently lowered to address any active bleeding.

Perfluorocarbon liquid was then injected to stabilize and flatten the posterior pole, followed by focal laser photocoagulation at the retinotomy site, fluid-air exchange, and C_3F_8 gas tamponade. This approach is based on principles previously described for surgical drainage of SMH and the use of subretinal tPA and perfluorocarbon liquids.[8-11]

RESULTS

Thirteen consecutive eyes with fovea-involving SMH (symptom duration of 2 to 12 days) were included. Four eyes had received prior intravitreal tPA 24 hours before surgery. Preoperatively, the mean BCVA was 1.78 ± 0.28 logMAR (approximately 20/1,200; range 20/660 to 20/90). The mean central macular thickness (CMT) was 589 ± 147 µm, and OCT imaging showed dense, hyperreflective subfoveal hemorrhage with foveal elevation in each eye.

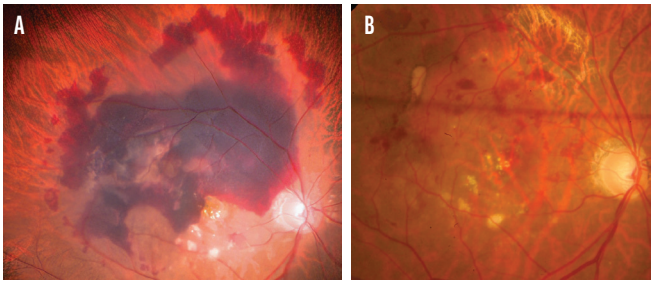

Figure 4. Preoperative fundus photography demonstrated a large subretinal hemorrhage secondary to active choroidal neovascular membrane in wet AMD (A). Postoperative fundus photography demonstrated the site of the smiley-shaped retinotomy with evacuation of the subretinal hemorrhage and minimal residual subretinal fibrosis (B).

At 6 months postoperative, mean BCVA improved to 0.52 ± 0.31 logMAR (approximately 20/66; mean gain 1.26 logMAR units; range 20/200 to 20/30), and mean CMT decreased to 232 ± 51 µm. OCT demonstrated complete hemorrhage clearance with restored foveal contour in seven eyes, restored contour with residual thinning in two eyes, and residual subretinal fibrosis in three eyes.

Eyes with complete anatomical restoration achieved superior visual outcomes. No cases of retinal detachment, recurrent hemorrhage, or persistent submacular blood were observed.

A GOOD OPTION IN SELECT CASES

Pneumatic displacement with intravitreal tPA and gas remains the preferred first-line approach for many cases of SMH.[3-5] However, in large, thick, and/or organized hemorrhages, incomplete clot liquefaction and displacement may limit visual recovery.[6,7]

TABLE. VISUAL, ANATOMICAL, AND OCT OUTCOMES OF SMILEY-SHAPED POSTERIOR RETINOTOMY

Case	Preoperative BCVA	Postoperative BCVA	Preoperative CMT (µm)	Postoperative CMT (µm)	Postoperative OCT Outcomes
1	Counting fingers at 2 m	20/50	612	300	Normal foveal contour restored
2	20/90	20/20	560	212	Complete SMH clearance
3	Counting fingers at 3 m	20/200	830	321	Subretinal fibrosis, pigmentary changes
4	Counting fingers, hand motion	20/50	432	194	Foveal contour restored with thinning
5	20/90	20/30	480	290	Complete SMH clearance
6	Counting fingers at 2 m	20/70	934	190	Foveal contour restored with thinning
7	Counting fingers at 4 m	20/90	425	241	Subretinal fibrosis, pigmentary changes
8	Counting fingers at 1 m	20/30	549	211	Normal foveal contour restored
9	Counting fingers at 3 m	20/200	642	160	Subretinal fibrosis, pigmentary changes
10	Counting fingers at 2 m	20/20	450	240	Complete SMH clearance
11	20/200	20/70	634	205	Complete SMH clearance

Abbreviations: CMT, central macular thickness; SMH, submacular hemorrhage

Direct surgical evacuation through a posterior retinotomy offers immediate clot removal, avoids dependence on postoperative positioning, and facilitates rapid anatomic restoration.[8-10] The curved or "smiley-shaped" retinotomy described in this series enables controlled access to the subretinal space while minimizing retinal trauma and preserving foveal integrity.

The significant reduction in CMT and restoration of foveal contour on OCT closely paralleled visual improvement, reinforcing a strong structure-function correlation. Residual subretinal fibrosis was associated with comparatively poorer outcomes, underscoring the importance of early intervention before irreversible photoreceptor damage occurs.

Although limited by its retrospective design and modest sample size, the study showed consistent anatomical and functional improvements, suggesting that this technique represents a valuable alternative approach in selected cases of large SMH. ■

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KEY TAKEAWAYS

- ▶ Large or organized submacular hemorrhage (SMH) may respond suboptimally to standard pneumatic displacement.
- ▶ Smiley-shaped posterior retinotomy for SMH repair allows for controlled subretinal clot evacuation.
- ▶ Immediate clot removal facilitates rapid anatomical restoration, and OCT-based foveal recovery correlates strongly with visual improvement.
- ▶ The smiley-shaped technique described in these cases may be particularly useful in thick, extensive, or non-displacing SMH.