7/30/2023 12:00 am

Surgery Symposium 2

Macular Structure Characteristics in Unilateral Idiopathic Full-Thickness Macular Hole and the Healthy Fellow Eyes

- Yi-Ting Hsieh, MD

Objective: Are there any predisposing macular structure characteristics for the development of macular hole?

Purpose: Previously we found that patients who had a wide-based foveal pit had a high prevelance of macular hole in the fellow eye.We hypothesize there are some macular structure characteristics that are prone to the development for macular hole.
Methods: Patients with unilateral full-thickness macular hole (FTMH) were retrospectively enrolled as the study group, and their age- and sex-matched individuals with no vitreomacular diseases as the control group. FTMHs were classified as FTMH with lamellar hole-associated epiretinal proliferation (LHEP), FTMH without LHEP or FTMH without vitreomacular separation. Macular structure parameters, including foveal base width (FBW), central foveolar thickness (CFT), central subfield thickness (CST), central subfield volume (CSV), and retinal artery trajectory (RAT), were measured using optical coherence tomography and fundus photography. These parameters were compared among different FTMH groups.
Results: A total of 68 patients (39 women) with unilateral FTMH and 68 healthy controls were enrolled. The RAT of the lesioned eyes (0.19±0.06) and the healthy fellow eyes (0.14±0.04) were both smaller than those of the normal controls (0.37±0.14) (P<0.001 for both). The FBW of the healthy fellow eyes (446.8±98.2 μm) were significantly larger than those in the control group (338.4±80.6 μm, P<0.001). No significant differences in any macular parameters were noted among the three different types of FTMH.
Conclusion: Patients with unilateral FTMH had a wider RAT in both the lesioned and healthy eyes, and a wider foveal base in their healthy fellow eyes than in normal controls. Such macular structure characteristics may be prone to macular hole formation.

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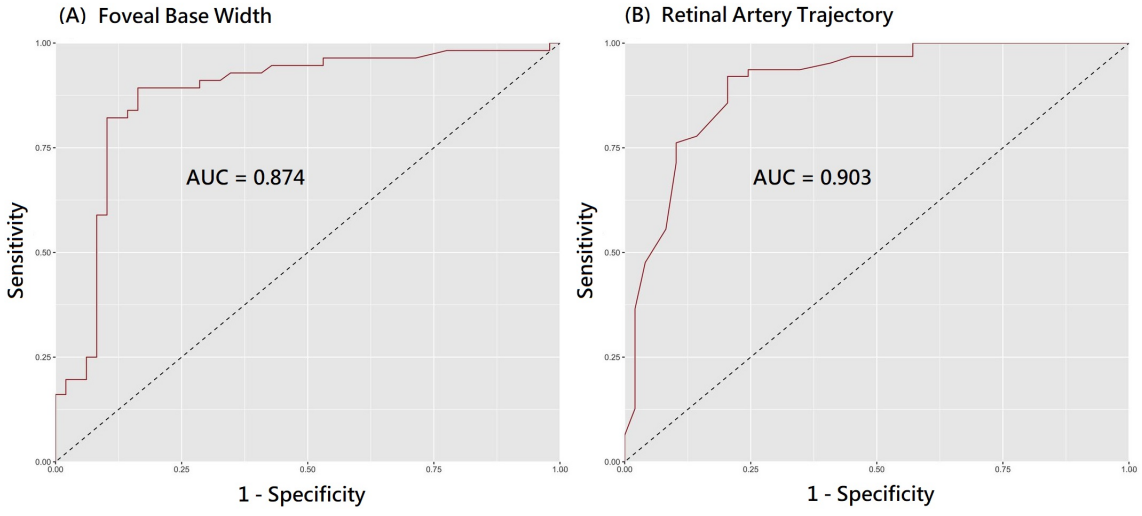

ROC curves for predicting full-thickness macular hole in the fellow eyes

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Clinical Characteristics of Full-Thickness Macular Holes That Closed Without Surgery

- J. Fernando Arevalo, MD, PhD, FACS, FASRS
- Hana Mansour, MD
- Sami Uwaydat, MD
- Ahmad Mansour, MD

Objective: To ascertain the anatomic factors that help achieve nonsurgical sealing in full thickness macular hole (FTMH).
Purpose: To ascertain the anatomic factors that help achieve nonsurgical sealing in full thickness macular hole (FTMH).
Methods: Retrospective collaborative study of FTMH that closed without surgical intervention.
Results: A total of 78 patients (mean age 57.9 years) included 18 patients with blunt ocular trauma and 18 patients that received topical or intravitreal therapies. Mean ± standard deviation of the initial corrected visual acuity in logMAR improved from 0.65 ± 0.54 to 0.34 ± 0.45 ($p<0.001$) at a mean follow-up of 33.8 ± 37.1 months. FTMH reopened in 7 eyes (9.0%) after a mean of 8.6 months. Vitreomacular traction was noted in 12 eyes (15.8%), perifoveal posterior vitreous detachment in 42 (53.8%), foveal epiretinal membrane in 10 (12.8%), cystoid macular edema (CME) in 49 (62.8%) and subretinal fluid in 20 (25.6%). By multivariate analysis, initial visual acuity correlated to the height ($p<0.001$) and narrowest diameter of the hole ($p<0.001$) while final visual acuity correlated to the basal diameter ($p<0.001$). Time for closure of FTMH (median 2.8 months) correlated to the narrowest diameter ($p<0.001$) and the presence of subretinal fluid ($p=0.001$). Mean time for closure (in months) was 1.6 for eyes with trauma, 4.3 for eyes without trauma but with therapy for CME, 4.4 for eyes without trauma and without therapy in less than 200µm in size and 24.7 for more than 200µm.
Conclusion: Our data suggest an observation period in new onset FTMH for nonsurgical closure, in the setting of trauma, treatment of CME, and size <200µm.

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Distal Internal Limiting Membrane Flap Techniques for Macular Holes

- Homayoun Tabandeh, MD, FASRS
- Christine Morozova, BS
- Andy Morozov
- Dan Kamen, BA
- Sergio Karageuzian, BS
- David Boyer, MD

Objective: To report on the outcomes of distal ILM flap techniques for macular holes.
Purpose: ILM flap techniques are associated with higher anatomic closure rates for MHs with high risk characteristics. In eyes with previously removed ILM, conventional flaps may not be plausible. Distal ILM flap (DIF) techniques involve harvesting a flap from the residual distal ILM. This study evaluates the outcomes for eyes undergoing a variety of DIF techniques.
Methods: Retrospective case series including eyes that underwent pars plana vitrectomy (PPV) and DIF for MH. The flap techniques included superior wide-base ILM flap transposition (SWIFT), pedicle ILM flap (P-ILM), and bi-peduncular ILM flap (BIF). Postoperative evaluation included ICG fluorescence imaging (ICG-FI) and optical coherence tomography (OCT).

Results: 43 eyes of 42 patients, mean age 68.3 years, were included in the study. The mean MH inner diameter was 540 μ with 21 eyes >450 μ , and 11 eyes > 650 μ . Eight (19%) eyes were highly myopic, 18 (42%) eyes had chronic MH, and 6 (14%) eyes had history of prior MH surgery. The ILM flap technique included SWIFT (27 eyes), BIF (12 eyes), and P-ILM (4 eyes).
The MH closed in 25 (93%) eyes with SWIFT, 11 (92%) eyes with BIF, 3 eyes (75%) with P-ILM. The ILM flap covered the MH completely in 22 (82%) eyes with SWIFT, in 10 eyes (83%) with BIF, and 1eye (25%) with P-ILM.

Conclusion: Distal flap techniques are useful in eyes with previously removed ILM and those in which ILM removal is desirable. P-ILM has a higher tendency to displace resulting in non-coverage of the MH. SWIFT and BIF provide coverage of MH in majority of the cases. BIF is particularly useful when there is limited residual ILM for flap formation

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Long-Term Visual and Anatomic Outcomes of Internal Limiting Membrane Flap vs Internal Limiting Membrane Peeling for Large, Full-Thickness Macular Holes

- Ankoor Shah, MD, FASRS
- Kaitlyn Richards, BS
- Ankit Kadakia, MD
- James Major, MD, PhD FACS FASRS
- Tien Wong, MD
- Eric Chen, MD
- Amy Schefler, MD FACS FASRS
- Sagar Patel, MD
- Rosa Kim, MD
- Christopher Henry, MD, FASRS
- Richard Fish, MD, FACS
- David Brown, MD
- Matthew Benz, MD
- William Pearce, MD
- Charles Wykoff, MD, PhD, FASRS

Objective: Are the long-term visual acuity and closure rates of internal limiting membrane (ILM) flap and ILM peeling techniques for repair of large full-thickness macular holes (FTMH) comparable?

Purpose: To determine and compare the efficacy of a surgical ILM flap technique and ILM peel on long term visual and anatomic outcome for large (>400 µm) full-thickness macular holes (FTMH).
Methods: This is a retrospective, consecutive, case control study. Patients with a FTMH >400 µm, with no prior history of attempted surgical repair, who underwent ILM flap technique (n=52) or ILM peel technique (n=407) with a minimum of 6 months postoperative follow up at a large retina practice were included. Patient data was included from October 2016 to July 2022 and institutional review board (IRB) approval was obtained. Demographic data, best-recorded visual acuity, anatomic size and subsequent closure of hole based on optical coherence tomography were included at 1, 3, 6, 12, 24, 36, and 48 months. Statistical analyses were performed with paired t-tests when comparing pre and postoperative vision changes, standard t-tests when comparing surgical techniques, and Chi-square testing for proportions.
Results: A total of 459 eyes of 441 patients were included in the study. At baseline, mean FTMH diameter at the base was 981.2±344.1µm (401-2060µm) and 873.2±333.5µm (404-4171µm) [p=0.03] with mean time of last follow-up 15.0±10.2 and 20.0±13.4 months for eyes undergoing ILM flaps and peels respectively. Preoperatively, the ILM flap and ILM peel groups included 23 (44.2%) and 160 (39.3%) pseudophakic eyes and 29 (55.8%) and 247 (60.7%) phakic respectively. Overall, for large FTMH, single operation closure rates were 94.4% and 94.6% (p=0.99) for ILM flaps and ILM peels respectively. Mean best-recorded logarithm of the minimal angle of resolution (LogMAR) visual acuity for ILM flaps and ILM peels respectively was 1.05±0.46 and 0.93±0.47 (LogMAR) preoperatively (Snellen 20/224 and 20/170) with last follow up acuity 0.59±0.52 (LogMAR, p<0.01) and 0.47±0.45 (LogMAR, p<0.01) at last follow up (Snellen 20/78 and 20/59) respectively. There was no statistically significant difference in visual acuity gains between the groups at 24 months, 36 months, and at last follow up.
Conclusion: The ILM flap and ILM peel techniques both provide significant anatomical and functional improvement in large FTMH with sustained benefits as far as 36 months. While eyes treated with ILM flaps had statistically significant larger mean macular hole size, there was no difference in visual acuity and closure rates at last follow up.

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Group	ILM Flap				ILM Peel				
Post-Op Visit	**Mean VA ± SD (LogMAR)**	**VA Change**	***p-value**	***n***	**Mean VA ± SD (LogMAR)**	**VA Change**	***p-value**	***n***	**^p-value**
Pre-op	1.05 ± 0.46			52	0.93 ± 0.47			407	0.08
Month 1	1.00 ± 0.63	0.05	0.50	48	0.77 ± 0.56	0.16	< 0.01	363	< 0.01
Month 3	0.80 ± 0.51	0.25	< 0.01	40	0.62 ± 0.48	0.31	< 0.01	270	0.03
Month 6	0.62 ± 0.40	0.43	< 0.01	47	0.58 ± 0.48	0.35	< 0.01	327	0.58
Year 1	0.64 ± 0.62	0.41	< 0.01	33	0.47 ± 0.42	0.46	< 0.01	312	0.04
Year 2	0.51 ± 0.52	0.54	< 0.01	13	0.41 ± 0.42	0.52	< 0.01	165	0.41
Year 3	0.48 ± 0.32	0.57	0.03	5	0.42 ± 0.44	0.51	< 0.01	89	0.75
Last follow up	0.59 ± 0.52	0.46	< 0.01	52	0.47 ± 0.45	0.46	< 0.01	407	0.09

Long term visual acuity outcome of ILM Flaps vs ILM Peels for holes > 400um

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Upright Positioning and Superior Internal Limiting Membrane Flap in the Surgical Repair of Idiopathic Macular Holes: Case Series

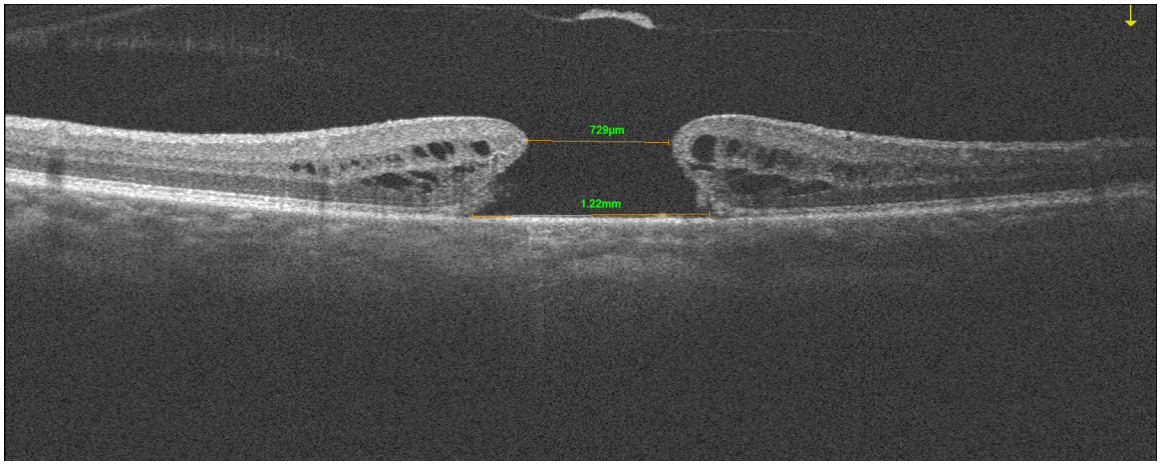
- Alan Dayan, MD
- Irene Zhou
- Ronald Gentile, MD
- Jessica Barest, MD

Objective: Can upright post-operative positioning be used instead of face down positioning after macular hole repair with the use of a superior ILM flap and SF_6 gas?
Purpose: Post-operative face-down positioning for macular hole (MH) repair is considered essential for anatomical MH closure by most retina surgeons. For patients with physical or mental limitations, however, face down positioning can be difficult, and in some cases, not possible. As surgical procedures improve, the need for face down positioning may not be necessary for MH closure. ILM peel with an inverted ILM flap developed by Nawrocki in theory may not need face down positioning since the inverted ILM bridges the MH and would not require complete gas tamponade. Herein we present our experience with upright positioning and a superiorly placed ILM flap in the surgical repair of idiopathic macular holes.

Methods: A retrospective review of consecutive patients with idiopathic macular holes who underwent pars plana vitrectomy (PPV) and ILM peel with a superiorly hinged inverted ILM flap and 25% SF_6 gas fill performed by a single surgeon. All patients assumed an upright position immediately following surgery and were instructed to be upright during the day and to sleep on either side at night. Data collected included preoperative MH size on optical coherence tomography (OCT), best corrected visual acuity at distance (BCVA) before and after surgery, and rate of macular hole closure at 1- and 3-months using OCT findings.

Results: 20 eyes of 20 patients (mean age 69 ± 7 years) with idiopathic macular holes who underwent superior inverted ILM flap macular hole repair were identified and analyzed. OCT mean pre-operative MH basal diameter (BD) was 948 ± 354 μm, with 50% of holes (10 of 20) having a BD of greater than 1 mm. Mean pre-operative MH minimum linear diameter (MLD) was 436 ± 225 μm, with 45% of holes (9 of 20) having a MLD of greater than 500 μm. At 1-month post-op, the success rate of hole closure was 100%. No patients required additional vitrectomy surgery for closure. At 3 months, the rate of hole closure remained at 100% and mean BCVA improved from 1.12 ± 0.68 logMAR (20/263) to 0.69 ± 0.44 logMAR (20/98) with 83% of patients gaining 1 or more lines of visual acuity.
Conclusion: Macular hole repair with PPV and ILM peel with superior ILM flap and post-operative upright positioning results in successful anatomic closure and improved visual outcomes. These findings support the theory that as MH surgical techniques improve, post operative face down positioning may not be necessary and upright positioning may be ideal.

IRB APPROVAL No - no IRB



Pre-operative OCT (BCVA CF 4 feet)

4 months post-op (BCVA 20/200). Arrow points to inverted flap.

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Epiretinal Proliferation in Eyes With Full-Thickness Macula Treated With the Inverted ILM Flap Technique

- Jerzy Nawrocki, MD, PhD
- Zofia Nawrocka
- Zofia Nawrocka, MD, PhD

Objective: To find out whether the presence of epiretinal proliferation affects outcome after the Inverted ILM flap Technique in full thickness macular holes.
Purpose:
During vitrectomy for full thickness macular holes after use of trypan blue we observed two patterns of staining, either homogenous bluish color of the macular area or negative staining around the center of the fovea. Lack of blue staining is usually considered as cellular epiretinal proliferation- most probably astrocytic gliosis. In our study, negative staining correlated in OCT to the appearence of epiretinal proliferation (EP).

Methods: Comparative Study of 39 eyes of 39 patients with full thickness macular holes. We included patients with good quality surgical video available and good quality preoperative and postoperative Swept Source OCT (SS-OCT) images and a follow- up of at least 12 months. In all cases the Temporal Inverted ILM (internal limiting membrane) Flap Technique was performed. During surgery the flap was created as usual without previous peeling of epiretinal proliferation. That means that both layers (epiretinal proliferation and ILM) were inverted upside down and put on the top the retina, covering the macular hole. Based on appearence during surgery patients were divided into two groups: group one with patients with an epiretinal proliferation (negative staining visible during surgery), group two: patients without epiretinal proliferation (homogenous staining visible during surgery). Macular hole minimum and maximum diameter, ellipsoid zone defects and external limiting membrane defects were measured and correlated to final visual acuity. A post- hoc analysis of preoperative images were analysed in order to detect this finding on SS-OCT.
Results: Macular holes were closed with one intervention in 100% of cases. Mean final visual acuity 12 months after surgery was 20/40 (range 20/200-20/20). Epiretinal proliferation was detected in 24 eyes (group 1), and 15 eyes without EP were included to group 2. The mean minimum diameter of full thickenss macular hole was significantly bigger in group 1 (579um) when compared to group 2 (389um) (p=0.008). Similarly, the mean maximum diameter was bigger in group 1 (1144um) when compared to group 2 (801um) (p=0.008).
Despite the preoperative macular hole size difference, both groups did not differ in regard to visual acuity 12 months after surgery (p=0.4).
Final visual acuity was higher in pateints with fewer ellipsoid zone defects (p=0.01) and fewer extrenal limiting membrane defects (p=0.02).
On white on black SS-OCT images it was possitble to distinguish epiretinal proliferation on preoperative images.
Conclusion: Epiretinal proliferation is a novel observation present in significantly larger full thickness macular holes.
The presence of epiretinal proliferation does not affect the final visual outcome after vitrectomy with the Temporal Inverted ILM Flap Technique. EP does not need to be additionally removed. A Flap consisitng of EP and ILM is a safe procedure.

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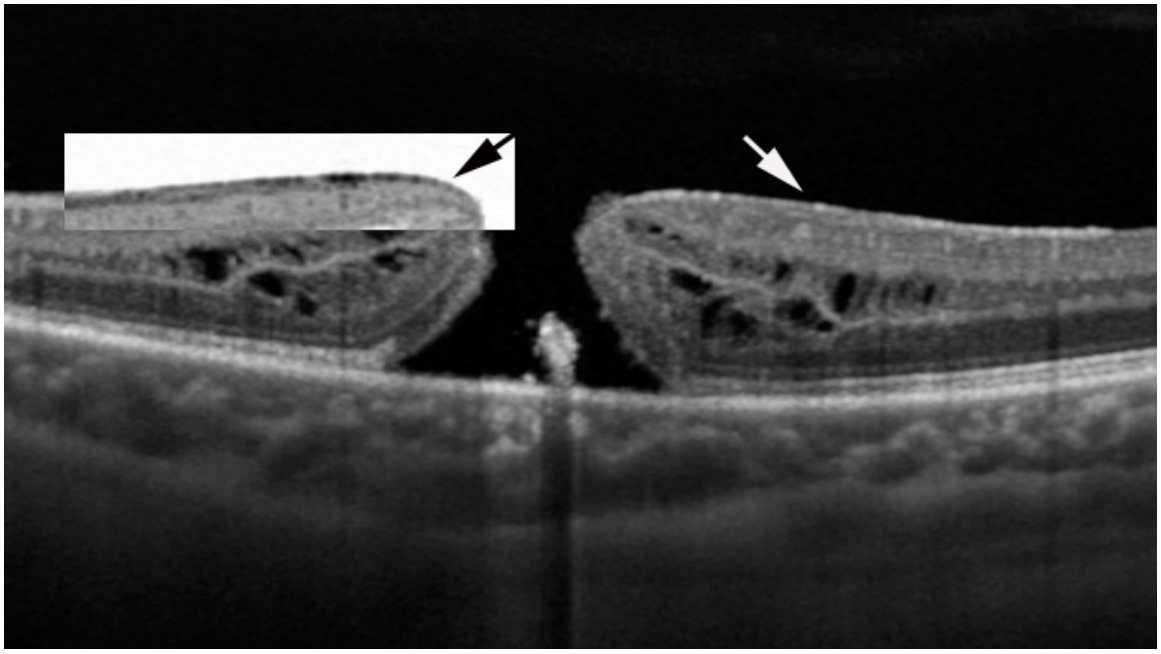
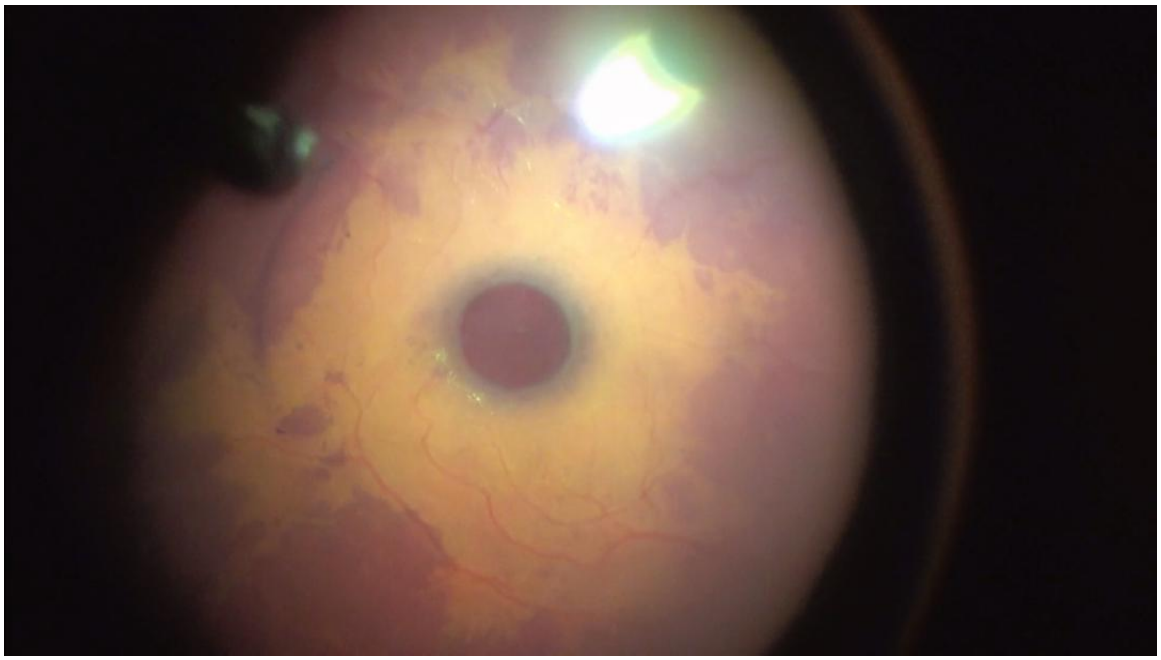


Epiretinal proliferation in full thickness macular hole (arrows)



Negative staining of epiretinal proliferation- full thickness Macular hole