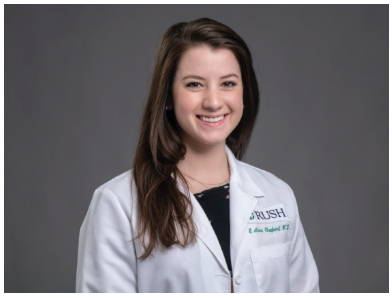
7/31/2023 12:00 am

Retinal Detachment Symposium

Risk of Rhegmatogenous Retinal Detachment With Proliferative Vitreoretinopathy in a Patient's Second Eye After RRD With PVR Development in the First Eye



- Emily Shepherd, MD
- Prithvi Bomdica, MD, MBA
- Samuel Minaker, MD, MSc
- Sam Rezaei
- Nick Boucher
- Nitika Aggarwal, BTech CS&T
- Mathew MacCumber, MD, PhD

Objective: This study assess the relative risk of developing proliferative vitreoretinopathy (PVR) after a retinal detachment (RD) repair in a second eye if the patient had initially developed PVR after RD repair in the first eye.
Purpose: Proliferative vitreoretinopathy (PVR) is a major complication of rhegmatogenous retinal detachments (RRD), and it is characterized by growth and contraction of cellular membranes within the vitreous cavity and on both sides of the retina. PVR is the most common cause for failure of RRD repair. The purpose of this study is to assess the risk for development of PVR after RD repair in a patient's second eye if the patient had initially developed PVR after RD repair in the first eye.
Methods: A retrospective cohort study was performed using the de-identified Vestrum Health Database. Patients who underwent unilateral RRD repair between January 2015 and August 2022 who had at least 3 months of follow-up were included in the study. Eyes with proliferative diabetic retinopathy were excluded. Among these patients, PVR rates were identified within 180 days following unilateral RRD repair. Within this cohort, patients who presented with or developed a RRD in the second eye were identified, and second eye PVR rates were then assessed.
Results: A total of 44,441 patients who initially had a unilateral RRD repair were identified. Mean age was 60 years old and 62% were male. This cohort can be stratified into 4,649 patients who subsequently developed PVR after RRD repair and 39,792 patients who did not develop PVR after RRD repair. Of the 4,649 patients, 289 presented with or developed a RRD in the contralateral eye. Of these 289 patients, 11 (4%) developed PVR in the contralateral eye. Of the 39,792 patients who did not develop PVR after the first eye RRD repair, 3,706 presented with or developed a RRD in the contralateral eye. Of these 3,706 patients, 128 (3%) developed PVR in the contralateral eye. The relative risk (RR) of PVR development in the contralateral eye if the first eye had developed PVR is 1.10.
Conclusion: Based on our data set, our relative risk of 1.10 implies that there may be a slightly higher risk of PVR in a patient's second eye if the first eye developed PVR. Our findings have potential implications regarding the need for prophylactic treatment at the time or after RRD repair to prevent PVR. Further investigation using this dataset is ongoing.

IRB APPROVAL No - no IRB

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Retinal Detachment Symposium

Extended Internal Limiting Membrane Peeling for Grade C Proliferative Vitreoretinopathy: International Multicenter Study

- Yoshihiro Yonekawa, MD, FASRS
- Taku Wakabayashi, MD
- Yusuke Oshima, MD, PhD
- David Xu, MD
- Annika Samuelson, BS
- Anahita Sehgal
- Akihiko Shiraki
- Nobuhiko Shiraki
- Kotaro Tsuboi, MD
- Yuki Yamamoto
- Yuichiro Ishida
- Keita Baba
- Hisashi Fukuyama
- Bita Momenaei , MD
- Robert Abishek
- Michael Cohen, MD
- Ajay Kuriyan, MD, MS
- Carl Park, MD
- Marc Spirn, MD
- Sunir Garg, MD, FACS, FASRS
- Michael Klufas, MD
- Fumi Gomi, MD, PhD
- Motohiro Kamei, MD

Objective: Can extended peeling of the internal limiting membrane (ILM) improve outcomes of rhegmatogenous retinal detachment (RRD) with grade-C proliferative vitreoretinopathy (PVR) that had surgical repair?

Purpose: To evaluate the efficacy of extended ILM peeling on the anatomic and visual outcomes of pars plana vitrectomy for RRD with grade-C PVR.

Methods: This multicenter, retrospective, case-control study examined patients who underwent vitrectomy with or without ILM peeling for grade-C PVR at five institutions between June 2016 and November 2021 and were followed for at least 6 months. Extended ILM peeling involved broad removal of the macular ILM from arcade to arcade, and in some cases, beyond the arcades as per surgeon preference. The primary outcome was single surgery anatomic success (SSAS) at 3 months in eyes with versus without ILM peeling. Secondary outcomes included re-detachment rate and postoperative visual acuity.

Results: We included a total of 307 eyes (307 patients); 157 eyes (51%) treated with ILM peeling were compared with 150 eyes (49%) treated without ILM peeling. Mean follow-up was 23.7±16.5 months, with no significant difference between the two groups. No differences were noted in baseline characteristics and surgical techniques, including age, macular status, extent of RD, preoperative visual acuity, scleral buckle, retinectomy, and tamponade agents. SSAS at 3 months was significantly higher in the ILM peeling group (46% vs. 27% under fluid without tamponade [P=0.001] and 86% vs. 76% if including silicone oil [P=0.037]). The retinal reattachment rate under fluid without tamponade was significantly higher in the ILM peeling group, both at 6 months (61% vs. 45%, P=0.005) and at final follow-up (78% vs. 62%, P=0.003) also. Significantly fewer re-detachments occurred in the ILM peeling group (0.39±0.66 vs. 0.59±0.83, P=0.010). Both groups showed significant visual improvement at 6 months (both $P < 0.001$). However, the ILM peeling group showed significantly better visual acuity and visual improvement at 6 months ($P < 0.001$ and 0.043, respectively). Multivariable regression analysis showed that extended ILM peeling was significantly associated with greater retinal reattachment without tamponade and better visual acuity at 6 months (P=0.005 and 0.002, respectively). Significantly fewer subsequent epiretinal membrane (ERM) surgeries were needed in the ILM peeling group (4% vs. 11%, P=0.035).

Conclusion: Extended ILM peeling for RRD with grade-C PVR resulted in superior anatomic and visual outcomes in this study, compared to vitrectomy without ILM peeling.

IRB APPROVAL Yes

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Retinal Detachment Symposium

Phase 3 GUARD Trial of ADX-2191 (Methotrexate for Intravitreal Administration) to Prevent Proliferative Vitreoretinopathy and Other Postoperative Complications

- Christina Flaxel, MD
- Jennifer Lim, MD, FARVO, FASRS
- Kevin Blinder, MD, FASRS
- Karen Gehrs, MD
- Leo Kim, MD, PhD
- Michelle Liang, MD, FASRS
- Tamer Mahmoud, MD, PhD
- Raymond Iezzi, MD, MS
- David Lally, MD
- G. Hubbard, MD
- Charles Wykoff, MD, PhD, FASRS
- Xihui Lin, MD
- Robert Mittra, MD, FASRS
- Yewlin Chee, MD
- Jorge Fortun, MD
- Lejla Vajzovic, MD, FASRS
- Jason Hsu, MD
- John Pollack, MD
- Dana Deupree, MD
- John Renfro, MD
- Marco Zarbin, MD, PhD

Objective: To evaluate the safety and efficacy of repeated intravitreal ADX-2191 injections (methotrexate USP) to prevent recurrent retinal detachment due to proliferative vitreoretinopathy (PVR).

Purpose: PVR represents a major unmet need. The GUARD Study was designed to evaluate the efficacy of ADX-2191 to prevent PVR.

Methods: Subjects with recurrent RD due to PVR with starfolds in at least three clock hours, or with an RD associated with an open globe injury, were eligible. Initially, subjects were randomized 1:1 to the Standard-of-Care or Intervention cohort. Due to reluctance of some investigators to enroll subjects who may be randomized to receive no treatment, the study was amended to a single-arm design and the primary endpoint changed to a comparison versus a historical control. ADX-2191 is specifically formulated for intra-ocular use with an optimal volume of administration (400µg/0.05mL).

Results: The primary endpoint was achieved: the Intervention Cohort had significantly fewer recurrent RDs (18.8%) than the historical study group (38.7%) up to Week 24 (odds ratio [OR] 0.49, p=0.001).

The key secondary endpoint was numerically in favor of ADX-2191: the proportion of subjects who developed recurrent RD due to PVR in the Intervention Cohort (18.8%) was less than that of the Control Cohort (20.6%) up to Week 24, but the difference was underpowered to reach statistical significance.

A post-hoc meta-analysis of all pre-specified secondary efficacy endpoints demonstrated statistically significantly benefit in favor of the Intervention Cohort over the Control Cohort (OR 0.6, p=0.047; Figure 1).

The incidence of punctate keratitis (16.2%), a well-known side effect of intravitreal methotrexate injection, was substantially less than previously reported with compoundedmethotrexate (58%). In addition, post-hoc meta-analysis indicated statistically significantly lower odds of experiencing other adverse events in the Intervention Cohort as compared to the Control Cohort (OR 0.3, p=0.002; Figure 2).

Conclusion: The primary endpoint of recurrent RD within 24 weeks was achieved in favor of ADX-2191 over historical control, suggesting that treatment with ADX-2191 may reduce recurrent RD in PVR patients.

Although the trial was not powered to demonstrate differences between the Interventional and Control Cohorts, ADX-2191 was numerically superior to routine surgical care for all pre-specified dichotomous endpoints, an effect that was statistically significant post-hoc.

In addition, proportionally fewer post-operative adverse events occurred following treatment with ADX-2191 relative to no treatment, an effect that was statistically significant post-hoc.

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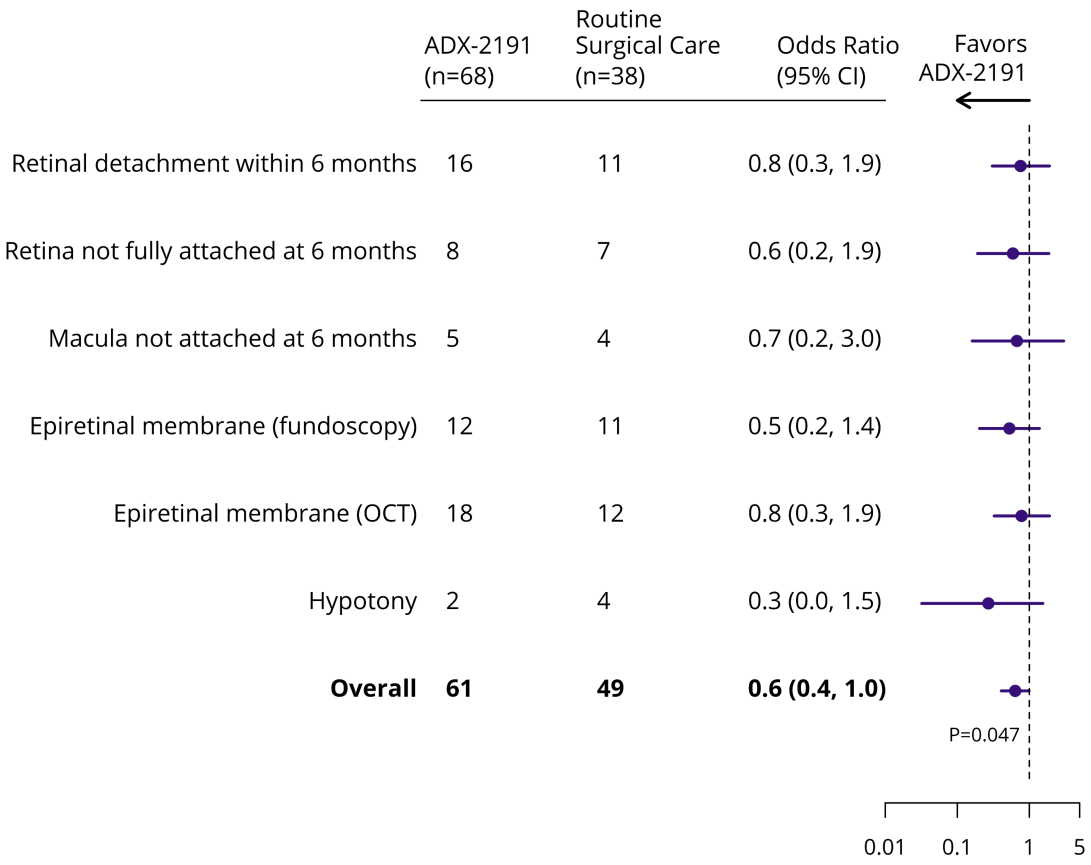
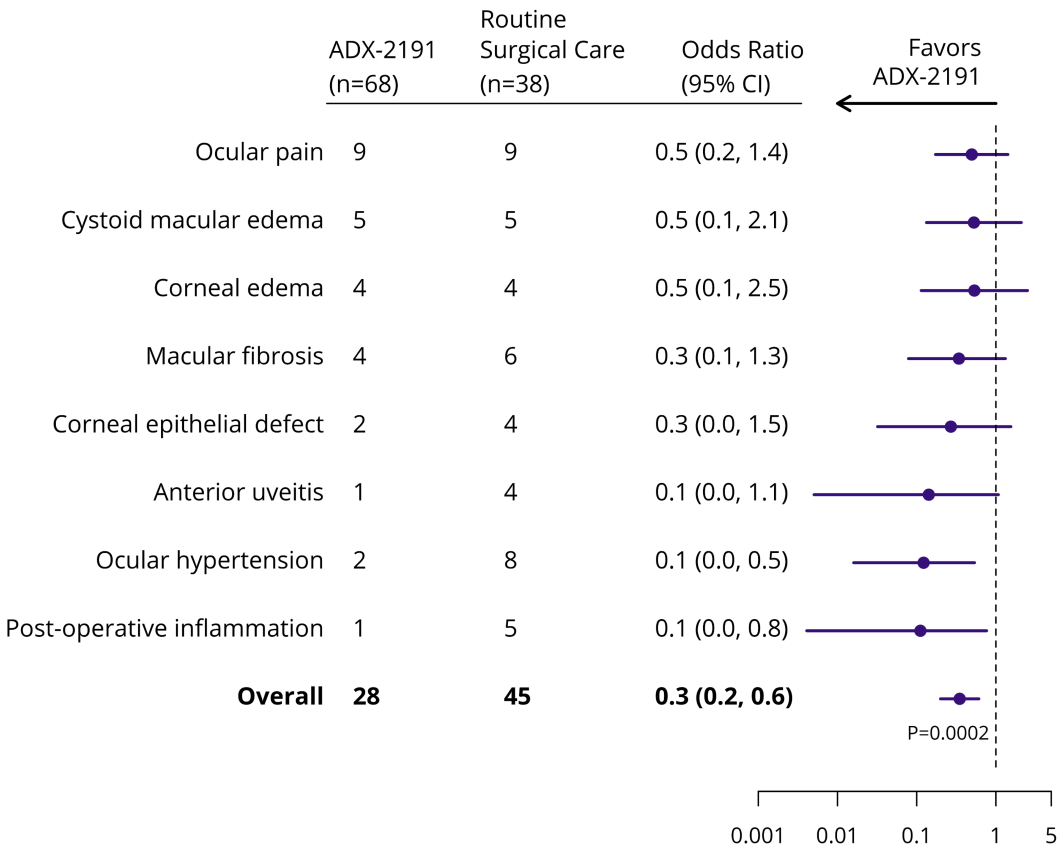


Secondary Efficacy Endpoints were Numerically in Favor of ADX-2191



Safety Endpoints Were Numerically in Favor of ADX-2191

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Retinal Detachment Symposium

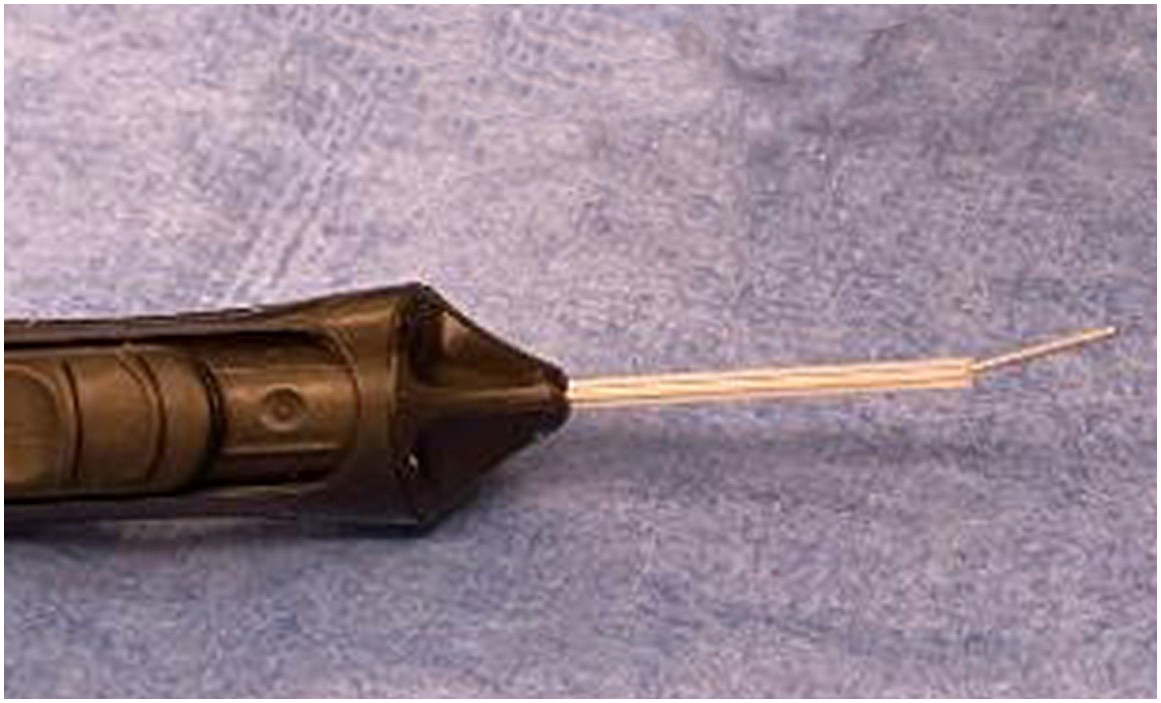
New "McGyver-Inspired" Endolaser Option for Chandelier-Assisted Scleral Buckles

- Richard Rosen, MD, DSc(Hon), FACS, FASRS, FARVO
- Nilesh Ravel, MD
- Yafeng Li, MD, PhD
- Alexander Pinhas, MD
- Gennady Landa, MD
- Avnish Deobhakta

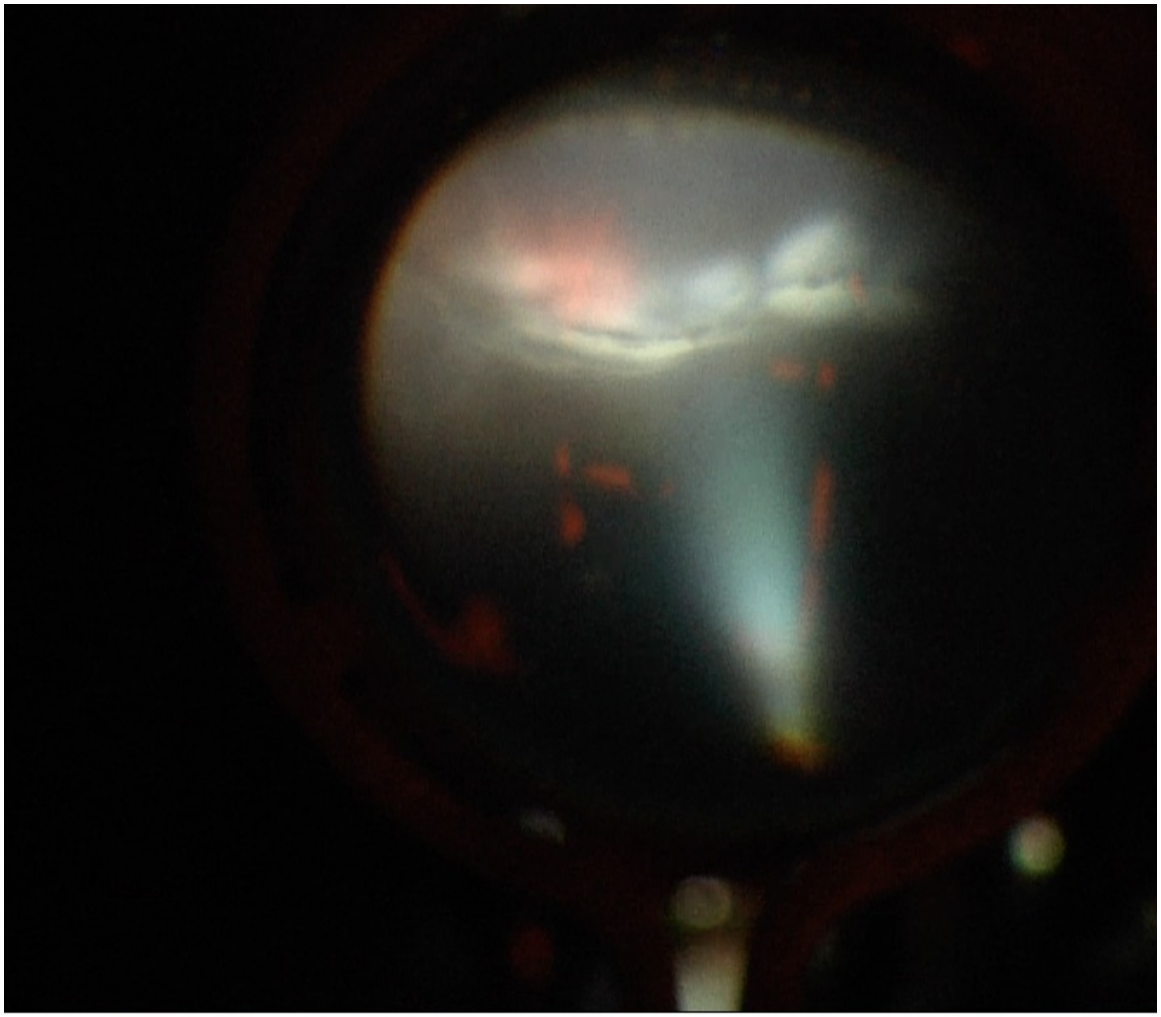
Objective: This pilot study describes a convenient solution for safe minimally-invasive endo-retinopexy to accompany chandelier-assisted scleral buckiling surgery.
Purpose: Despite the recent surge in popularity of chandelier-assisted scleral buckling, given the superior visualization provided by the operating microscope, a safe convenient technique for applying laser retinopexy has been lacking. Invoking our "McGyvering skills" we developed a novel modification of the illuminated endolaser which facilitates safe minimally -invasive endophotocoagulation without leaving the operating microscope environment.
Methods: A commercial lighted endolaser fiber (Vector™, Alcon, Fort Worth, Texas) was modified by adding a Teflon sleeve consisting of an 18-gauge angiocath cut to the appropriate length (20mm) which limits the intraocular penetration of the laser probe to the precise length of a conventional chandelier(7mm). The sleeve abuts the 25-gauge trocar limiting entry of the laser fiber into the vitreous, avoiding any drag on the retina. The extended internal working distance of the laser is compensated for by increasing the power and exposure settings, and by applying scleral depression beneath the targeted region of treatment. A pilot series of six phakic patients with rhegmatogenous retinal detachments who underwent primary scleral buckling with chandelier endoillumination, external drainage, and endophotocoagulation using the novel modified endolaser instrument are reported herein.

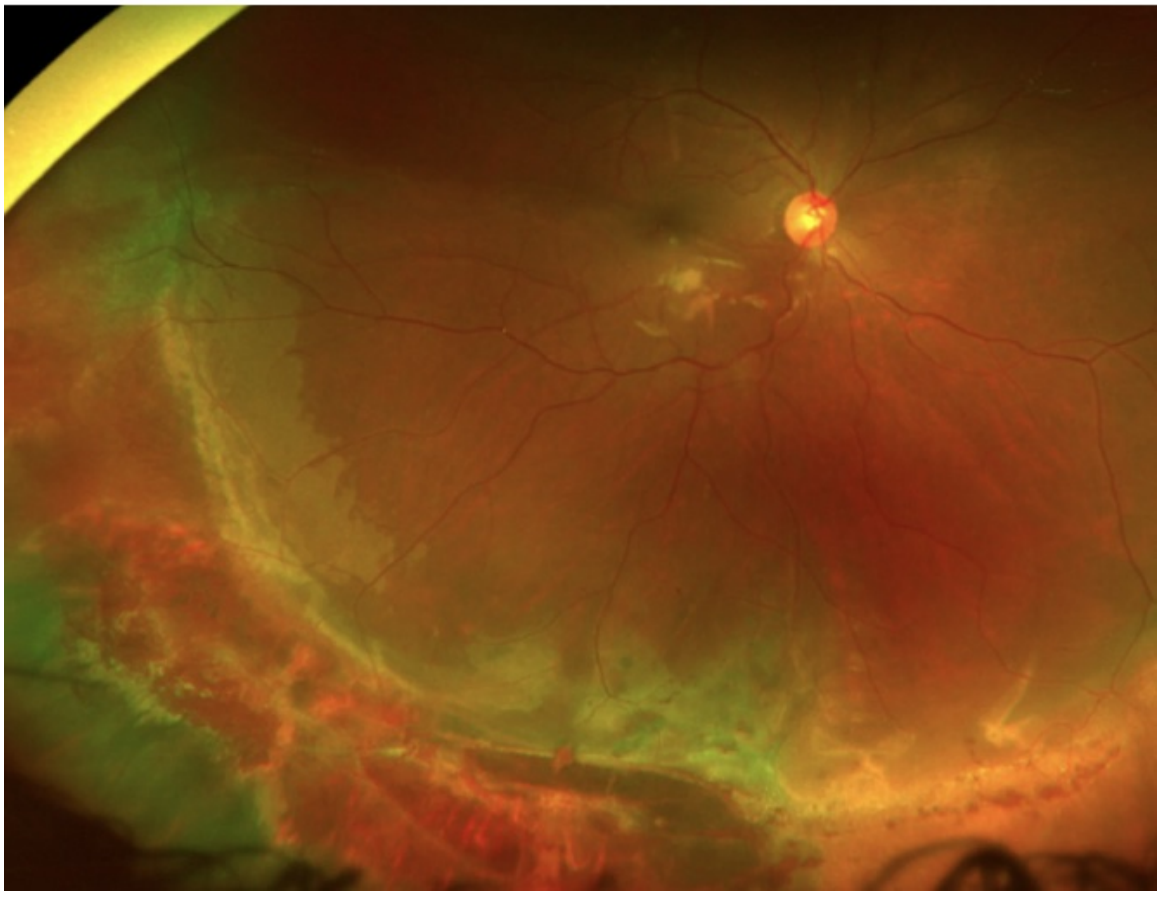
Results: All patients were successfully reattached using primary scleral buckling without any significant intraoperative or postoperative complications at one month. One patient with persistent traction required a secondary pars plan vitrectomy at 6 weeks. There were no significant complications related to the procedure
Conclusion: This novel, "McGyver-Inspired" endolaser modification is a convenient, safe alternative to indirect laser or cryo for non-vitrectomized eyes undergoing chandelier scleral buckling.

IRB APPROVAL No - no IRB



18 Gauge Angiocath Guarded Lighted Endolaser probe





Intraocular endo-retinopexy (above) . Laser Scars on buckle (below)

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Retinal Detachment Symposium

Time Course of Outer Retinal Restoration Afyer Vitrectomy for Fovea-off Rhegmatogenous Retinal Detachments

- Bryon McKay, MD, PhD, FRCSC
- Aditya Bansal, MD
- David Wong, MD, FRCS(C), FASRS
- Alan Berger, MD, FRCS(C), B Sc
- Rajeev Muni, MD, MSC, FRCS(C), FASRS

Objective: To investigate the natural time-course of outer retinal restoration following vitrectomy for fovea-off rhegmatogenous retinal detachments (RRD) over 2 years post-surgery
Purpose: Photoreceptor integrity is critical to visual acuity following retinal detachment. To date a paucity of data exists on the time-course of microstructural recovery of the outer retina following pars-plana vitrectomy for retinal detachments.
Methods: Retrospective analysis included 198 eyes (198 patients, 59±12y) with primary uncomplicated fovea-off RRD that underwent 23g pars plana vitrectomy (PPV). Primary outcomes were visual acuity (BCVA) and discontinuity of the external limiting membrane (ELM), ellipsoid zone (EZ) and interdigitation zone (IDZ) on spectral-domain optical coherence tomography (SD-OCT) at 3-, 6-, 12- and 24-months post-surgery.
Results: Baseline BCVA was 1.45±0.78 LogMAR, improving to 0.96±0.58 LogMAR at 3mo, 0.81±0.50 LogMAR ($p<0.05$) at 6mo, 0.66±0.80 LogMAR ($p<0.05$) at 12mo, and 0.51±0.45 LogMAR ($p<0.05$) at 24mo. Discontinuity of the ELM improved from 34% at 3mo, to 25% at 6 months, 23 % at 12mo ($P<0.05$) and 21% at 24mo ($P<0.001$). EZ discontinuity improved from 49% at 3mo to 33% at 6mo, 29% at 12mo ($p<0.05$), 27% at 24mo ($p<0.01$). IDZ discontinuity improved from 62% at 3mo to 51% at 6mo, 41% at 12 mo ($P<0.05$), and 31% at 24mo ($p<0.001$). Central retinal thickness was not significantly different throughout the time-course (3mo: 251±115mm, 6mo: 269±119mm, 12mo: 277±106mm, 24mo: 268±103mm). The presence of outer retinal folds improved from 13.0% at 3mo to 7.4% at 6mo ($p<0.05$), 4.8% at 12mo ($P<0.001$), and 3.7% at 24mo ($P<0.001$).
Conclusion: Following vitrectomy for fovea-off RRD, time-course of restoration of the outer retinal microstructure occurs in a step-wise fashion with reconstitution of the ELM followed by the EZ and lastly the IDZ. The time-course of outer-retinal microstructural recovery closely parallels the timeline of improvement in BCVA. Improvement in retinal microstructure and BCVA improves significantly through the first 12 months and continues to improve out to 2 years post-surgery.

IRB APPROVAL Yes

7/31/2023 12:00 am

Retinal Detachment Symposium

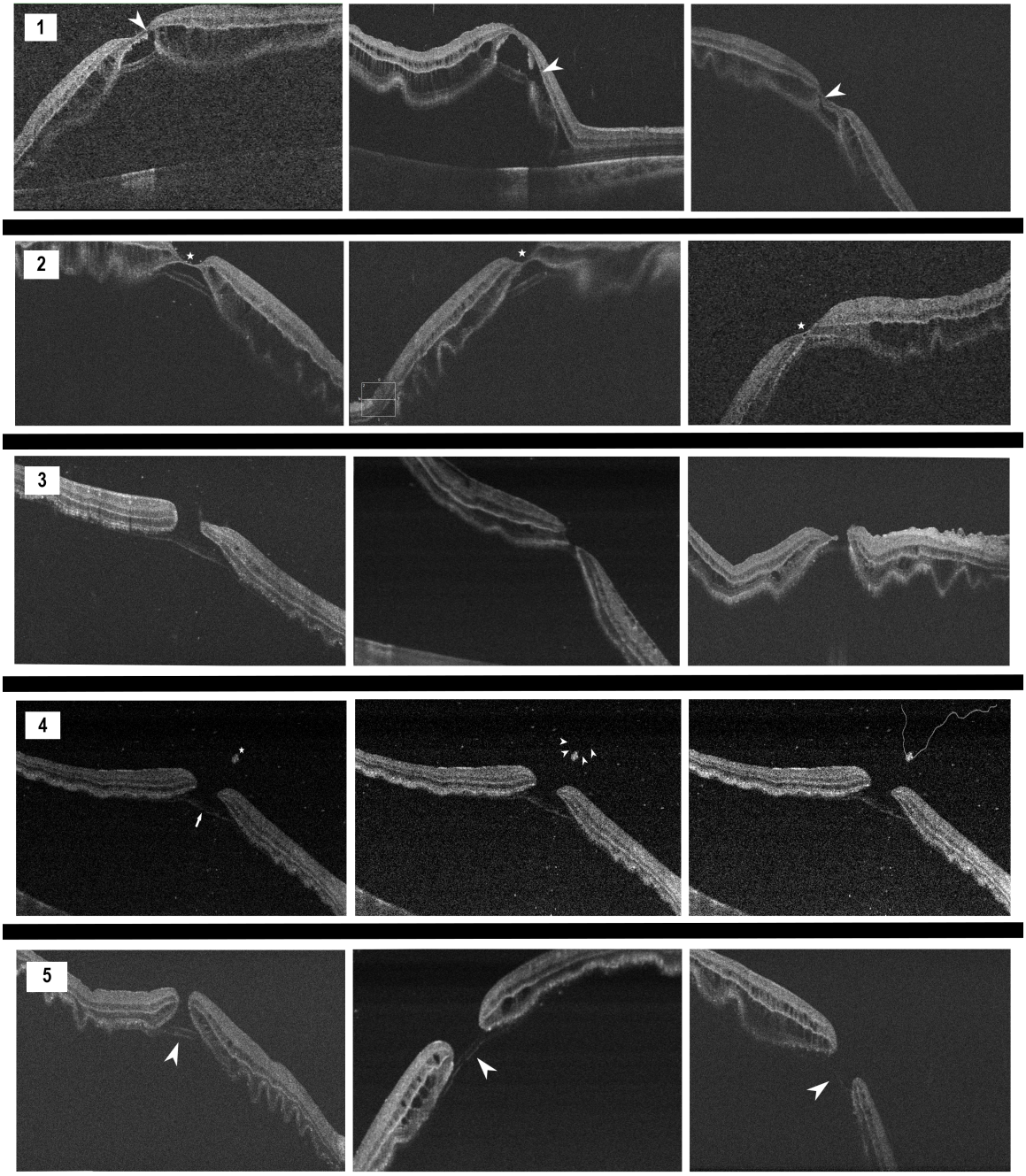
Bacillary Layer Detachment in the Pathophysiology of Secondary Macular Hole in Fovea-off Rhegmatogenous Retinal Detachment

- Isabela Martins Melo, MD
- Aadi Jhaveri, BHSc, MD (Candidate)
- Aditya Bansal, MD
- Paola Oquendo
- Wei Wei Lee, MD
- Rajeev Muni, MD, MSC, FRCS(C), FASRS

Objective: To explore the pathophysiology of secondary macular hole (MH) formation in rhegmatogenous retinal detachment (RRD) by assessing bacillary layer detachment (BALAD) and associated foveal abnormalities using optical coherence tomography (OCT).
Purpose: Novel insights in preoperative OCT show that BALAD is associated with MH formation in RRD. Understanding its pathophysiology may have significant implications for management.

Methods: Single-centered retrospective cohort including 360 consecutive primary fovea-off RRDs referred between January 2012-September 2022. Pre-operative OCTs were assessed for BALAD and foveal structural abnormalities, including associated lamellar and full-thickness MH (FTMH).
Results: 22.5% (81/360) of patients had evidence of BALAD or associated abnormalities at presentation. 8% (29/360) of patients had a MH associated with the RRD, of which 79.3% (23/29) were lamellar holes with the posterior border of BALAD intact (BALAD-lamellar hole), and 20.6% (6/29) were FTMH. Immediately following reattachment, 62% (18/29) of MHs persisted, while 31% (9/29) closed with RRD repair alone, without ILM peeling and 7% (2/29) had additional procedures performed during the initial repair to close the MH. Of those that persisted, 83% (15/18) had BALAD-lamellar hole, all of which had subsequent loss of photoreceptor remnants in a mean of 8.1 (±3.2SD) days, progressing to FTMH. Detailed analysis of OCT imaging demonstrated the spectrum of morphological changes from BALAD to FTMH. Salient features are shown in the corresponding figures (1-5) and include (1) cleavage planes extending from the Henle fiber layer (HFL)-outer plexiform at the foveal walls into the anterior aspect of the BALAD cavity; (2) significant thinning of the central outer nuclear layer (ONL); (3) loss of the Müller cell cone (MCC) with residual medium reflectivity tissue remnants at the inner edges of the foveal walls; (4) retinal tissue operculum attached to vitreous strands in proximity to the BALAD-lamellar hole; and (5) progressive thinning/degradation of the posterior border of the BALAD-lamellar hole leading to FTMH. A cohort of histological sections from normal eyes was assessed to assist with OCT interpretations and to determine possible areas of low mechanical stability within the fovea.
Conclusion: This large retrospective study provides novel insights into the progression from BALAD to BALAD-lamellar hole and subsequent FTMH in RRD. Specific OCT morphological features suggest that hydration, tractional forces, and cystic/cellular degeneration are key processes. OCT interpretations guided by histological sections of normal eyes demonstrating probable areas of low mechanical stability suggest that the pathophysiological process occurs with sequential structural changes in four critical areas: RPE-photoreceptor interface, myoid zone, HFL-OPL at the foveal walls and the junction of the MCC with surrounding foveal tissue. This process culminates in photoreceptor-MCC disjunction leading to BALAD-lamellar hole and subsequent degradation of photoreceptor remnants leading to FTMH.

IRB APPROVAL Yes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7/31/2023 12:00 am

Retinal Detachment Symposium

Dropless Vitrectomy Surgery for Retinal Detachment; Efficacy and Safety Compared to Standard of Care

- K. Chalam, MD, PhD, MBA, FRCS(C), FASRS
- Kinza Ahmad, MD
- Harris Ahmed, DO, MPH

Objective: Single intraoperative (trimoxi) triamcinoloneacetonide–moxifloxacin injection without postoperative drops effectively control inflammation after vitreous surgery for repair of rhegmatogenous retinal detachment and not inferior to standard drop therapy

Purpose: To compare the safety and effectiveness of intravitreal injection of triamcinolone acetonide–moxifloxacin (Tri-Moxi) to a standard eye drop regimen in controlling postoperative inflammation, visual acuity, resolution of retinal detachment and the rate of high intraocular pressure (IOP) in patients undergoing vitrectomy surgery for rhegmatogenous retinal detachment in an academic setting.

Methods: In this retrospective longitudinal comparative study, the electronic medical records of patients who underwent vitrectomy surgery for rhegmatogenous retinal detachment using single intravitreal injection of triamcinolone acetonide–moxifloxacin injection (Imprimis) at the end of surgery were reviewed (Group 1) and compared with patients who received a standard topical regimen of tapering doses of steroid-antibiotic(Tobradex) eye drops (Group 2) in terms of degree of intraocular inflammation, OCT thickness, visual acuity, resolution of retinal detachment and the rate of high IOP. Postoperative observations were made at days 1, 42 (6 weeks) and 90 (three months). Anterior chamber cell reaction and corneal edema were graded on a scale of 0 -4.

Results: A total of 108 consecutive eyes (Group 1 [54 eyes], Group 2 [54 eyes]) of 104 patients were included in the study. The anterior chamber cell reaction severity decreased by 13.0%, and 24.0% at 6 weeks and 90 days, respectively, after surgery following triamcinolone acetonide–moxifloxacin injection (Group 1) compared with standard eye drop therapy ($P < .001$ and $P < .02$, respectively). The best corrected visual acuity improved about 3 lines on average in both groups, 90 days after surgery compared with the pre-operative values ($P < .001$).

Resolution of retinal detachment was similar in both groups (94.4% vs 96.29% $P = 0.82$). Macular thickness measured with OCT was similar in both groups ($332\mu \pm 38$ vs $322\mu \pm 44$; $P = 0.67$) at 90 days postoperatively. Severity of corneal edema (odds ratio, 1.36; $P < .001$) on postoperative day 1, with no statistically significant difference at 6 weeks and 90 days ($P < 0.26$ and $P < 0.42$, respectively). There was no statistically significant difference in the rate of high IOP between the two groups at different time points postoperatively. High intraocular pressure was defined as IOP higher than 24 mm hg

Conclusion: Attainment of good outcomes in vitrectomy surgery depend in part on patient compliance. Triamcinolone acetonide–moxifloxacin injection is an effective method to control intraocular inflammation after vitrectomy surgery for retinal detachment and not inferior to standard postoperative topical therapy.

It is a promising substitute for standard eye drop therapy, especially for patients non-compliant (unable to fill medication for financial reasons or physical disabilities) with eye drop usage

IRB APPROVAL Yes

7/31/2023 12:00 am

Retinal Detachment Symposium

Intraretinal Silicone Oil Migration: An Under-recognized OCT Phenotype

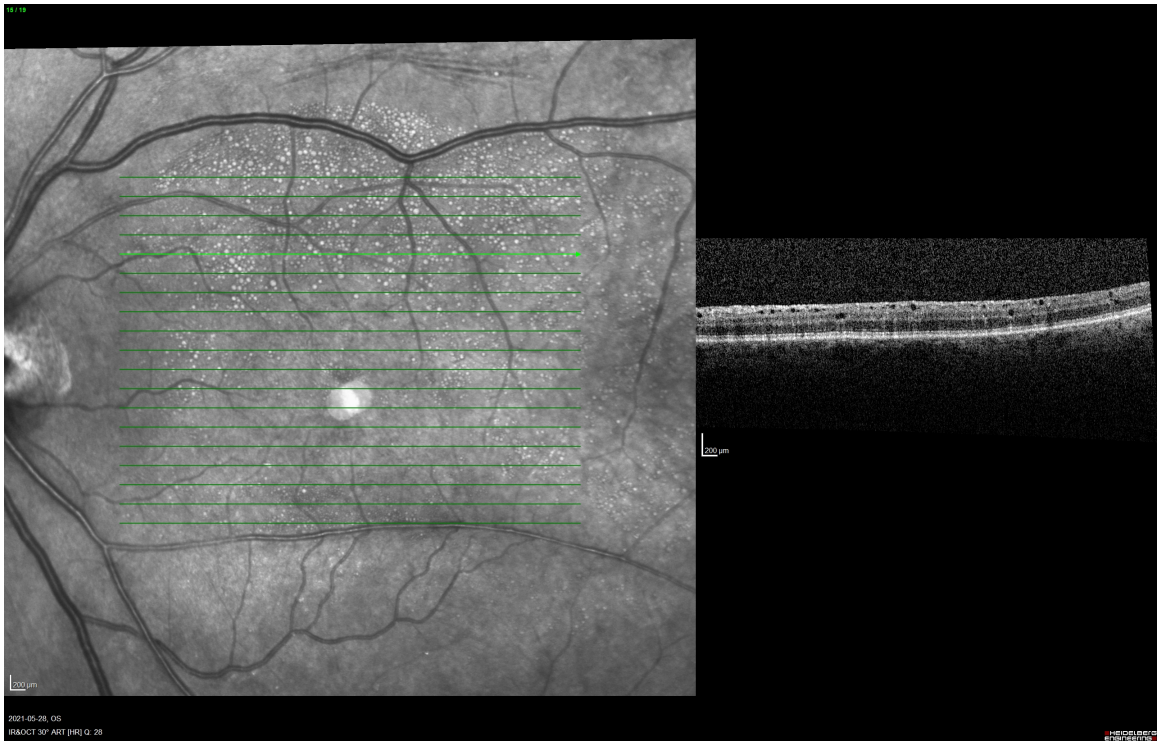
- Carl Shen
- Daisy Liu
- Chao Chen
- Sterling King
- Mark Greve, MD, FRCS(C)
- Mark Seamone, MSc MD

Objective: To characterize the clinical and optical coherence tomography (OCT) features of consecutive patients presenting with a constellation of findings believed to represent intraretinal migration of silicone oil (IRSO)
Purpose: IRSO is an under characterized phenomenon that may have implications for the techniques involved in oil placement and removal
Methods: Retrospective consecutive cases series. 1309 patients were identified through a review of electronic medical records (HealthQuest) by searching all operative reports for cases of silicone oil removal between November 1, 2016, and June 2nd, 2022. Three hundred fifty-one cases were excluded due to inadequate image quality to assess for intraretinal silicone oil, inadequate follow up post oil removal, or silicone oil still in situ at last follow up were excluded. Records were reviewed including the results of clinical examination and OCT retinal imaging. To characterize the phenotype, severe cases were identified by the presence of >50 droplets of presumed intraretinal silicone oil on the ETDRS macular grid and involvement of the central subfield.

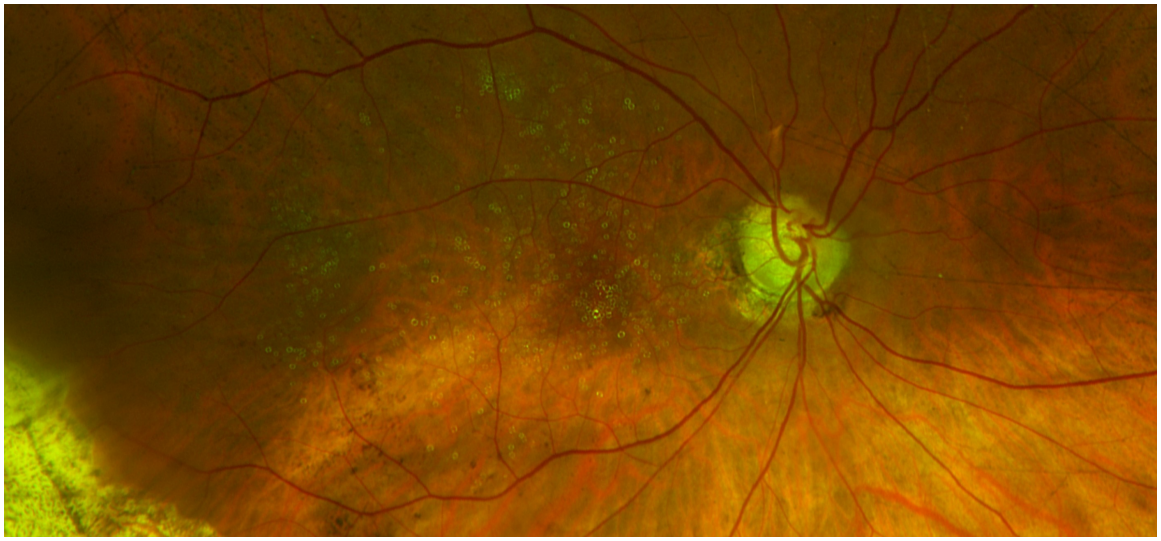
Results: Of the 958 cases adequate for assessment, 28 cases (2.9%) met criteria for severe IRSO and were included in this series. All patients had characteristic round hypo-reflective spaces favoring the inner retinal layers on OCT with increased hyperreflectivity in the deeper retinal layers and corresponding hyperreflective spherules on near-infrared en face imaging. No patients had perfluoro-N-octane used in any surgery. Average age was 66.5 ± 16 between 10 females and 18 males. Presenting visual acuity prior to silicone oil placement was 20/400 ± 205 with 2 patients light perception. Surgical indication for silicone oil placement was primary retinal detachment in 20/28 cases and recurrent retinal detachment in 8/28 cases. All patients had had their macular ILM removed by the time of silicone oil instillation. Oil was in situ for an average 220 ± 198 days before removal. IRSO was detectable by OCT while oil was in situ in 20/23 cases. The earliest IRSO was detected after oil placement was 16 days. Average IOP while oil was in situ was 20.5 ± 7 mmHg. Average follow up from time of oil out was 353 ± 529 days. The final VA achieved at last follow up was worse than the best VA achieved while oil was in situ in 18/28 cases.

Conclusion: We characterize an underrecognized phenotype of intraretinal silicone oil which presents with a constellation of OCT findings distinct from other consequences of silicone oil use. Further investigation into the clinical effect of this finding is warranted.

IRB APPROVAL Yes



Example IRSO OCT



Example IRSO Color