

Refer This, Not That: Retinal Decision Making

Julie Rodman OD, MSc, FAAO

Professor,
Nova Southeastern University
College of Optometry
Fort Lauderdale, FL

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RODMAN DISCLOSURES

- iCare
- Visionix
- Astellas
- Apellis
- LKC
- Regeneron
- Notal Vision

The following financial relationships have been mitigated

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PATIENT PRESENTATION

- 58-year-old female
- Presents for comprehensive, diabetic eye exam
 - Patient reports **blurry vision OD>OS**, doesn't seem to go away
- Type 2 DM x 10 years
 - FBS that morning: 188, HbA1c 8.0
- BCVA measured **20/40 OD** and 20/20 OS

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WHAT IS THE DIAGNOSIS?

DR/DME?

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Non-Proliferative Diabetic Retinopathy (NPDR): AOA

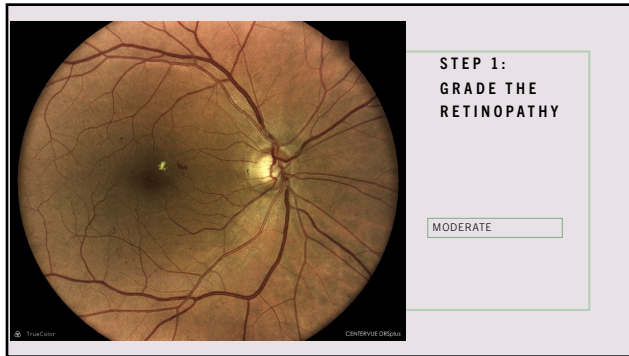
Mild NPDR	MAs only
Moderate NPDR	MAs plus exudates, cotton wool spots, retinal hemorrhages, IRMA, VB
Severe NPDR	Any of the following and NO signs of PDR: (4-2-1) • Severe intraretinal hemorrhages and microaneurysms in each of 4 quadrants • Definite venous beading in 2 more quadrants • Prominent IRMA (≥ETDRS standard photograph 8A) in at least one quadrant.
Very-Severe NPDR	2 or more criteria (4-2-1) rule are met

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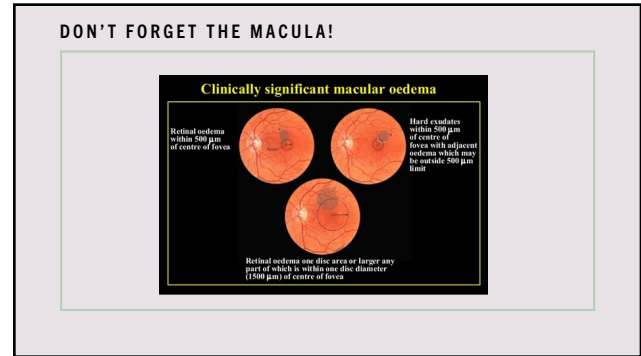
Proliferative Diabetic Retinopathy (PDR)

PDR	Neovascularization of the disc (NVD) or neovascularization elsewhere (NVE)
High-Risk PDR (DRS)	1. NVD > 1/4-1/3 disc area 2. Any NVD associated with VH or preretinal heme 3. Any NVE associated with VH or preretinal heme

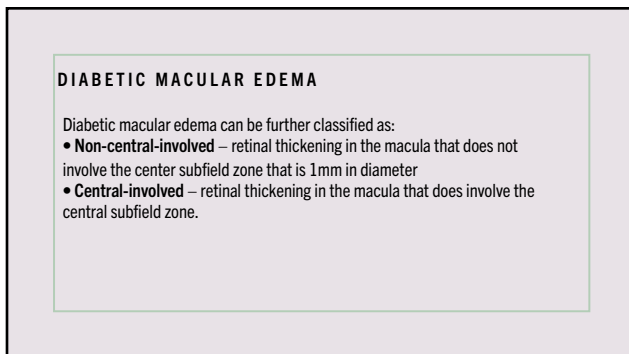
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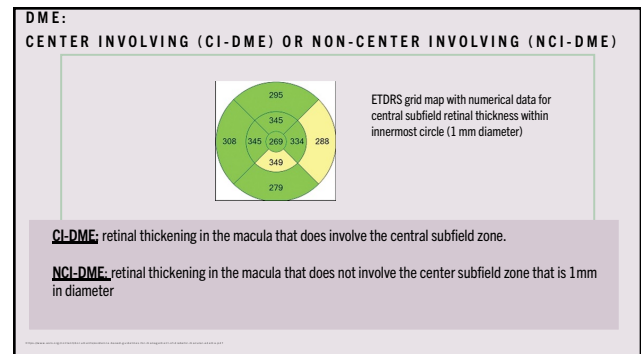
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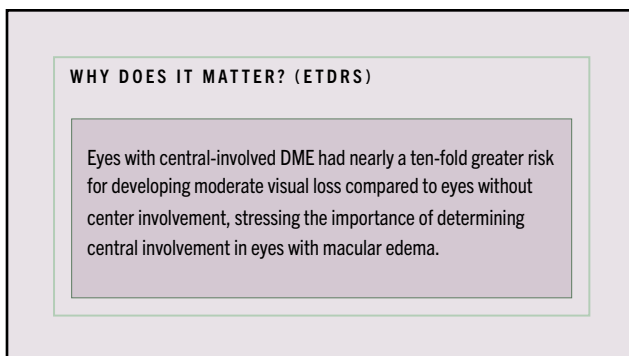
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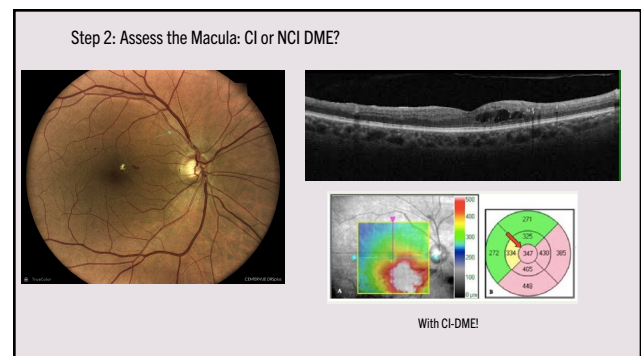
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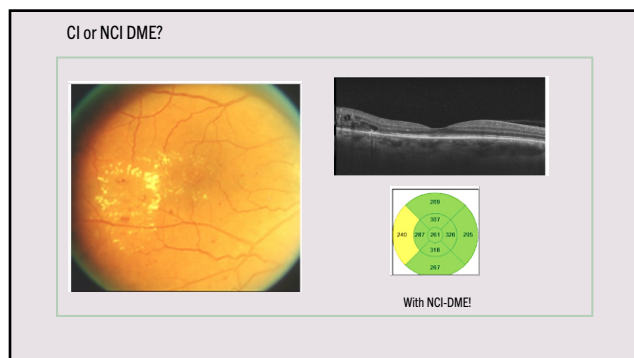
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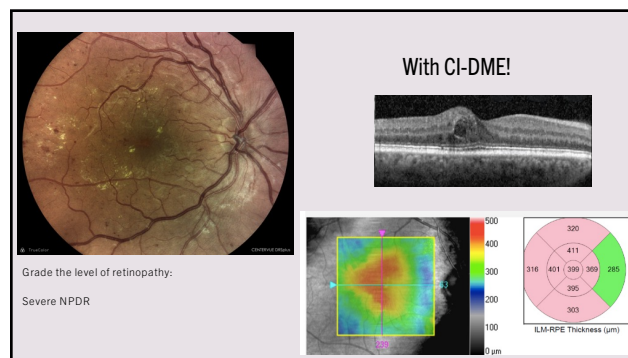
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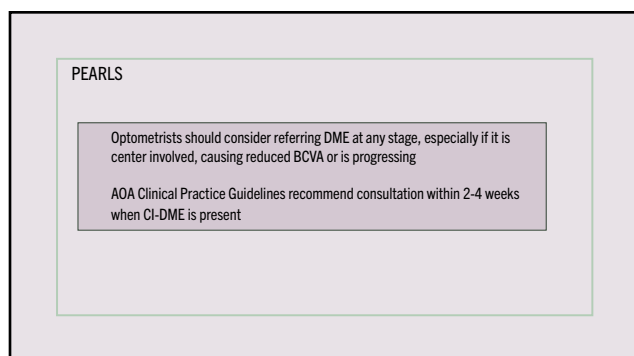
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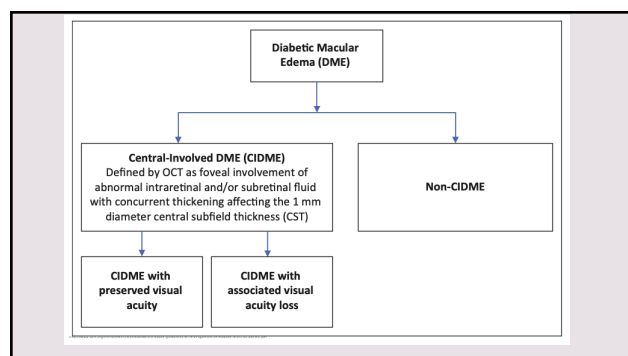
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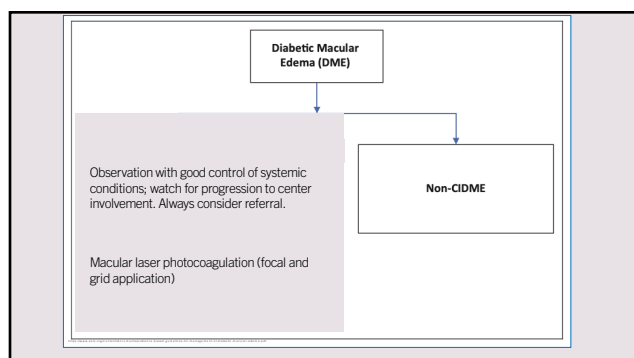
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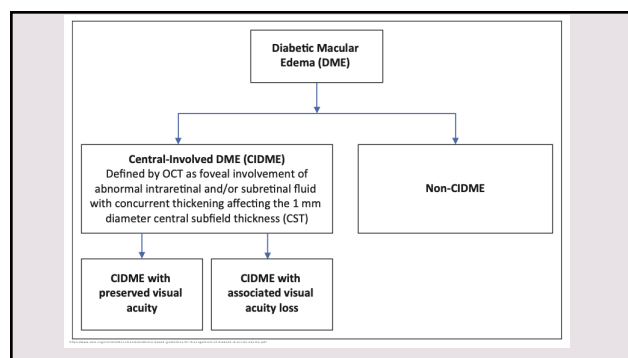
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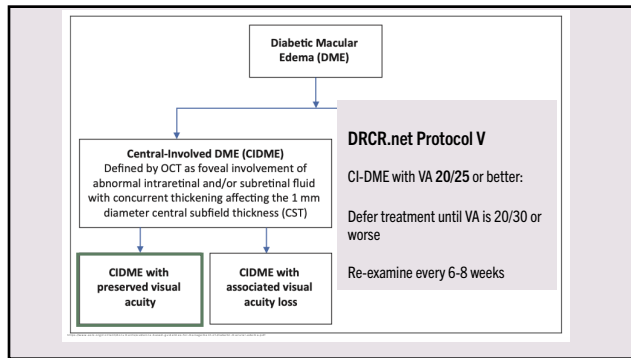
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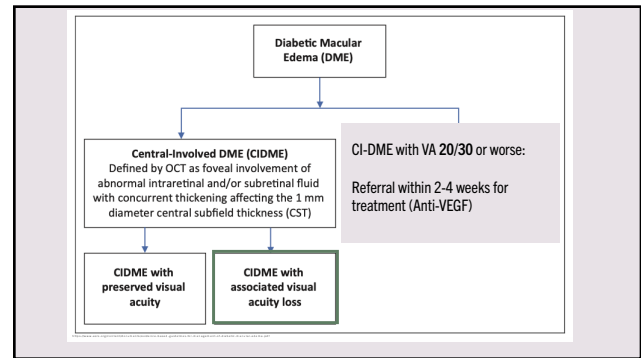
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Some anti-VEGF drugs used to treat DME include:

Aflibercept (Eylea)
Approved by the FDA in 2014, this drug may help control retinal swelling better than other anti-VEGFs

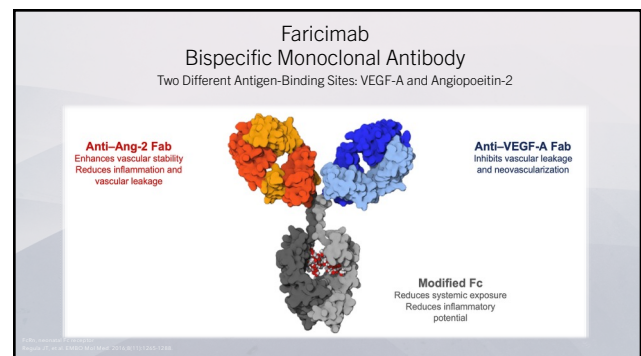
Bevacizumab (Avastin)
Used off-label for ocular conditions since 2005, this drug may lead to greater improvements in macular thickness than laser treatment

Ranibizumab (Lucentis)
Approved by the FDA in 2012, this drug can help prevent visual loss and improve vision

Brolucizumab
Approved by the FDA in 2022, this drug may help control retinal swelling better than other anti-VEGFs

Faricimab
Approved by the FDA in 2022, this drug works similarly to aflibercept and ranibizumab, but also targets the Ang-2 pathway

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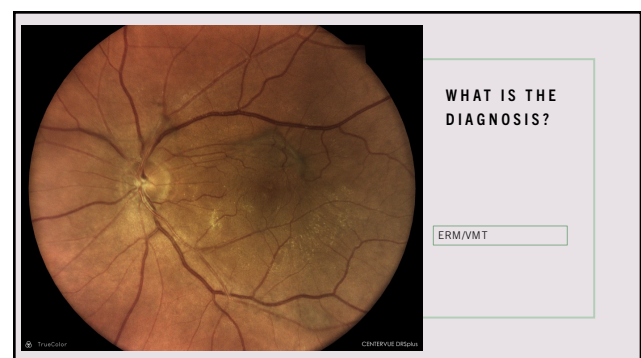


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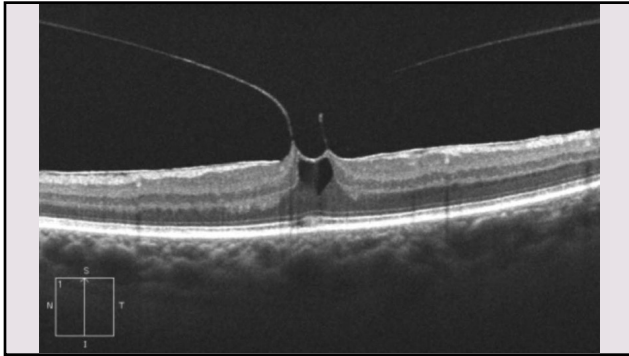
PATIENT PRESENTATION

- 60-year-old female
- Photopsia, mild metamorphopsia OS**
- BCVA measured 20/20 OD and **20/50 OS**

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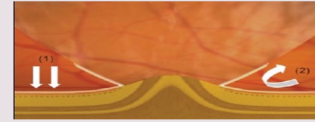
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ERMs are sheet-like structures that develop on the inner surface of the neurosensory retina.

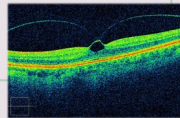
"Proliferation of glial cells"



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VMT occurs when the posterior cortical vitreous partially separates from the retina, yet some tractional areas remain adherent to the central 3mm of the fovea causing anatomic changes.

Epiretinal membranes and VMT often occur together in the same eye.



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Epiretinal Membrane: Risk Factors

- The risk of developing an ERM increases with age, and persons with predisposing ocular conditions may develop ERM at an earlier age.

>50 years: 2% have ERM

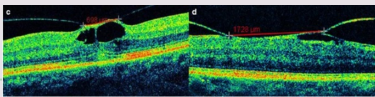
>75 years: 20% have ERM

- In about 10% to 20% of cases, both eyes have ERMs, but they can be of varying degrees of severity.

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MANAGEMENT: ERM/VMT

- The current standard of care: (AOA/AAO)
 - Early stage, asymptomatic ERM and/or VMT
 - Monitor every 2-6 months
 - Shorter follow-up intervals (patients with focal VMT or history of MH in the fellow eye)



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TREATMENT

Vitrectomy with membrane peel

- *decrease in visual acuity (<20/40)
- *metamorphopsia
- *double vision
- *difficulty using their eyes together.

Vitrectomy surgery for ERM or VMT usually leads to improvement of the metamorphopsia and visual acuity.

- On average, approximately 80% of patients with ERM or VMT will improve by at least two lines of visual acuity following vitrectomy surgery.

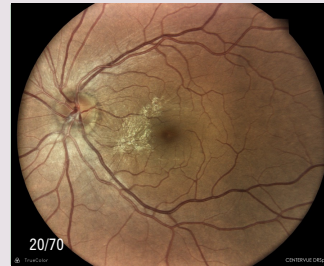
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CLINICAL PEARL

The majority of ERMs will remain relatively stable and do not require therapy. In patients who have areas of vitreomacular traction (VMT) of 1500 μm or less, the incidence of spontaneous release of traction from the macula occurs in approximately 30% to 40% of eyes over a follow-up of 1 to 2 years.

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Case: 67 year-old male



"I am seeing shadowing and doubling of images.... It started yesterday..."

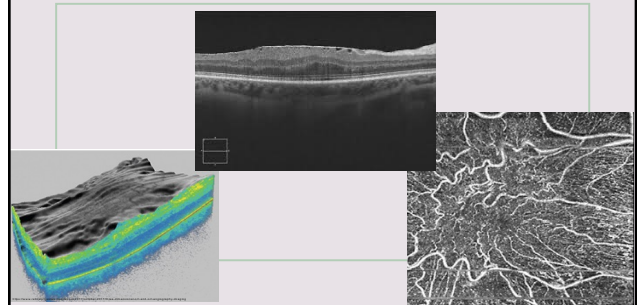
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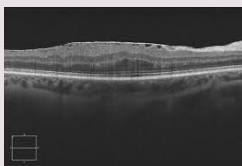
Fibrous tissue is observed over the macular area, causing significant wrinkling of the retinal surface and modification of the retinal vessel trajectory.

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Case: 67 year-old male



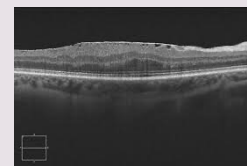
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Which is not true of this OCT?

1. Epiretinal membrane
2. Foveal thickening from traction
3. Widening of outer plexiform layer
4. Full thickness macular hole formation

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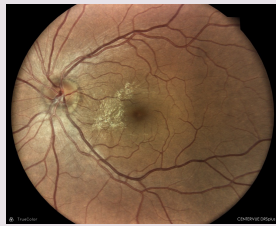


Which is not true of this OCT?

1. Epiretinal membrane
2. Foveal thickening from traction
3. Widening of outer plexiform layer
4. Full thickness macular hole formation

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Case: Management



Vision? 20/70
Symptomatology?
Shadowing/Doubling!!

Vitrectomy!!

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WHAT IS THE
DIAGNOSIS?

ERM

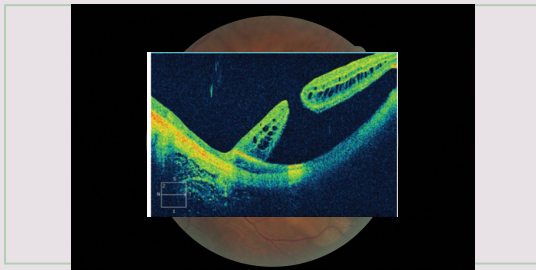
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ASK YOURSELF THESE QUESTIONS:

1. Is the patient symptomatic?
2. What is his visual acuity?

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AND WHAT CAN GO WRONG....

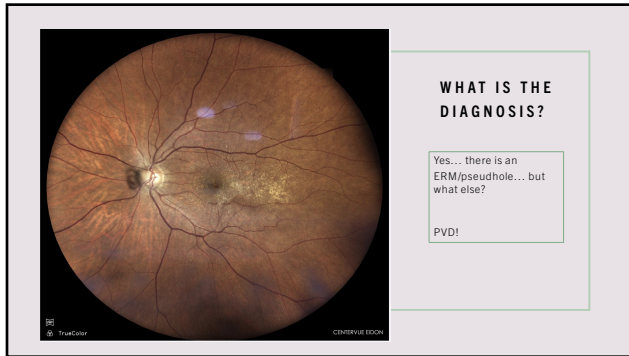


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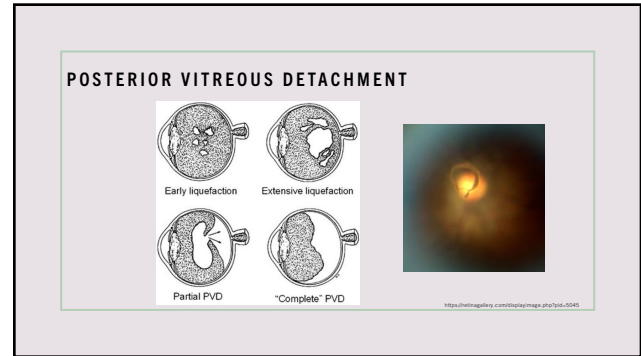
PATIENT PRESENTATION

- 76-year-old male
- Recent onset floaters OS x 2 days; feels like big spider web in vision; no flashes
- BCVA 20/20 OD; 20/40 OS

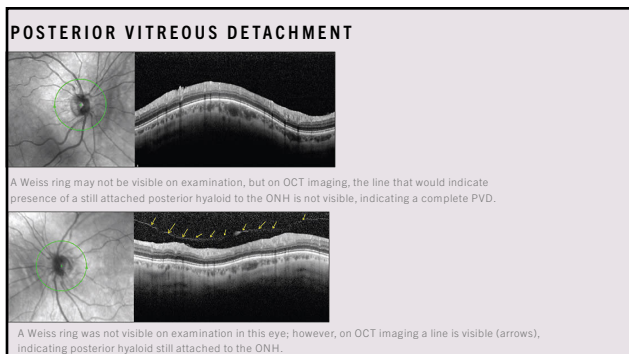
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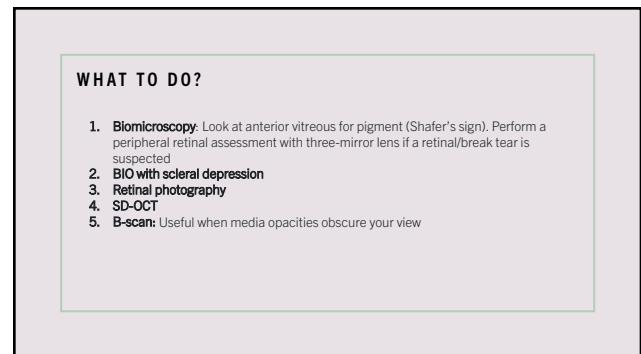
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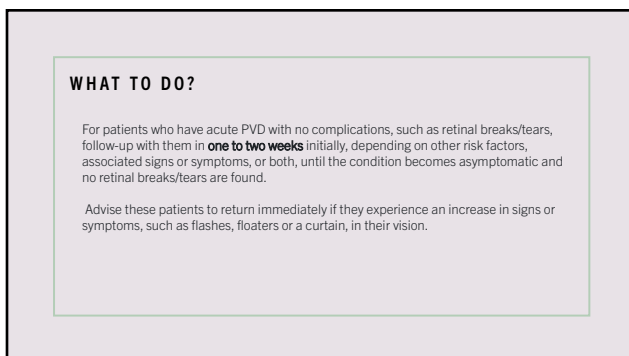
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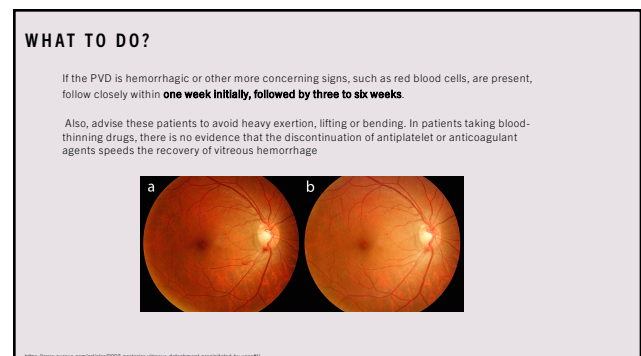
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MANAGEMENT

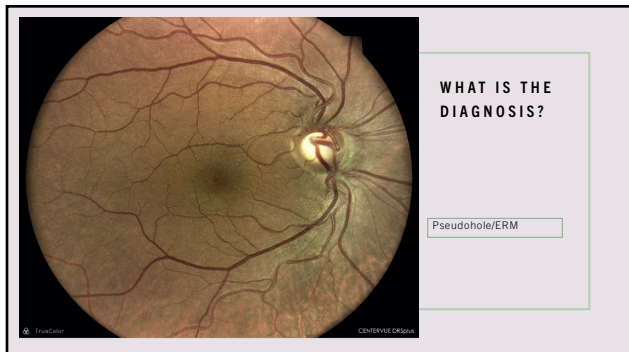
A retinal consult is necessary for acute symptomatic PVD with retinal breaks/tears because of the risk of a retinal detachment. Laser treatment is performed to prevent progression to a retinal detachment. Even when a patient has undergone adequate treatment, long-term follow-up is important because between 5% and 14% of patients who have an initial retinal break/tear will develop additional breaks/tears during long-term follow-up, reports the *American Journal of Ophthalmology*. A retinal detachment warrants immediate referral, especially if the macula is attached, to a retinal specialist for surgery.

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PATIENT PRESENTATION

- 45-year-old male
- Asymptomatic
- BCVA 20/20 OD; 20/20 OS

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Macular pseudoholes are partial thickness holes that resemble a "U" shape and can be related to ERM. Partial thickness macular hole have an incomplete loss of tissue from ILM to RPE. During clinical exam, it will appear as a circular or oval reddish lesion similar to a FTMH.

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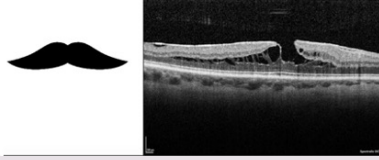
PARTIAL THICKNESS MACULAR HOLE

Lamellar Hole: Tractional and Degenerative

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LAMELLAR HOLE: 2 TYPES

Tractional: "Moustache" appearance

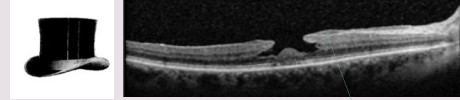


- ❖ Must Have:
ERM and foveoschisis

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LAMELLAR HOLE: 2 TYPES

Degenerative: "Top Hat" appearance



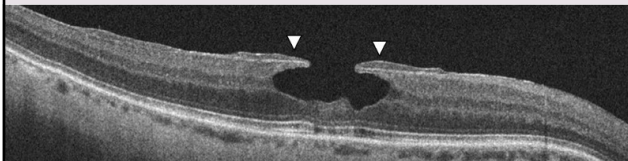
MUST HAVE:

- ❖ Irregular foveal contour
- ❖ Foveal cavitation with round edges
- ❖ Loss of foveal tissue (thinning)

??Epiretinal proliferation

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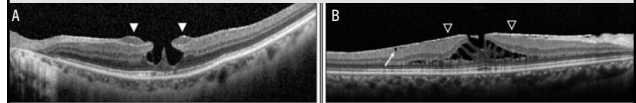
What is Epiretinal Proliferation?



A thick, homogeneous, isorefective layer covered by a thin hyper-reflective line at the edges of the hole contiguous with the inner retina

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Quiz: Degenerative or tractional?



A: Degenerative

- ❖ Irregular foveal contour
- ❖ Foveal cavitation with round edges
- ❖ Loss of foveal tissue (thinning)

B: Tractional

- ❖ ERM and foveoschisis

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MANAGEMENT

*Surgical intervention tends to be controversial as surgical results are variable.

There may be reason to recommend surgery in patients with partial thickness macular holes:

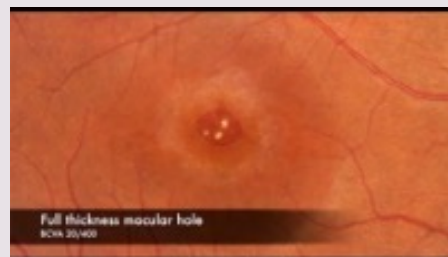
- * functional or anatomical deterioration
- * metamorphopsia
- * poor entering visual acuity resulting in inability to perform daily tasks.

Other guidelines recommend surgical intervention whenever VA <20/40 and there is evidence of ERM. Surgical options include phacoemulsification with vitrectomy and ERM and ILM peeling. ILM inverted flap.

*Preoperative defects in the PIL are associated with worse visual prognosis

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Modified inverted ILM flap technique



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PATIENT PRESENTATION

- 73-year-old Caucasian male
- Presented for comprehensive eye examination
 - **CC: Difficulty seeing at night**
- Social history: **(+)Smoker x 40 years**
 - Still smokes 1 pack/day
- PFH: **(+)GF: AMD**
- BCVA **20/40 OD; 20/20 OS**

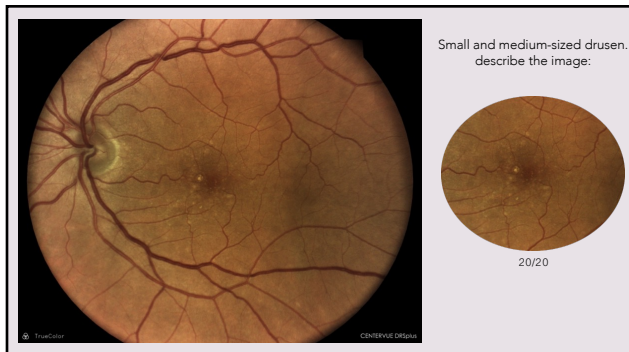
What is the diagnosis?

AMD, What type?

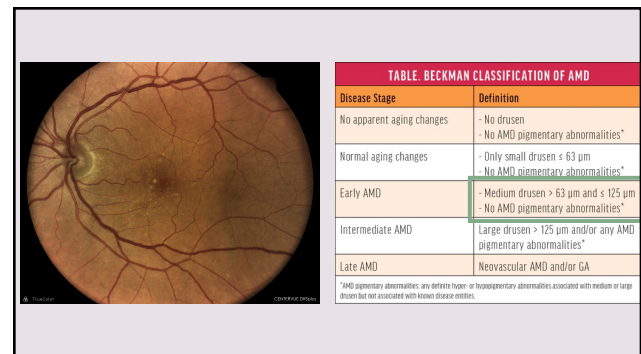


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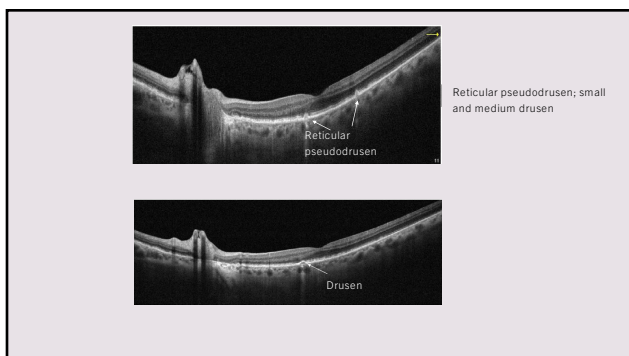
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2 years later.



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WHAT ABOUT INTERMEDIATE AMD?

Home Remedies and Lifestyle Changes for AMD



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HOME MONITORING AND ARTIFICIAL INTELLIGENCE

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WHEN & WHY DO WE NEED HOME MONITORING?

- Home monitoring is critical for patients:
 - Who are at risk or suffer from an acute condition
 - Where prompt intervention can significantly impact the outcomes

Example: Age Related Macular Degeneration (AMD)

- Home monitoring can help in AMD management by:
 - Early detection of conversion from intermediate to wet-AMD
 - Detection of reactivation of wet-AMD

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EXAMPLE OF HOME MONITORING TOOLS FOR AMD

ForeseeHome Monitoring Program



- For detection of conversion from intermediate to wet-AMD
- Uses peripheral hyperacuity perimetry (PHP)
- Machine learning algorithm to infer metamorphopsia from testing pattern

Home OCT Monitoring Program



- For detection of reactivation of wet-AMD
- Allows capture of OCT data at patient's home
- Uses deep learning algorithm to segment hyporeflective (often fluid) in retina

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FORESEEHOME CASE STUDY

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nAMD CATCH CASE → INITIAL EXAM (OU): 10/22/19

- AMD x 3 years
- OCT Findings:** Extensive drusenoid PEDs OU; essentially flat OD, suspicious for leak OS
- Plan:** Discussed findings with patient, take AREDS2 eye vitamins, wear hat and sunglasses when outside, maintain a healthy diet and exercise
- Referred for ForeseeHome OU and cataract surgery consult**
- RTC:** 2 months after cataract removal for exam and OCT OU

OD 20/50-

OS 20/30+

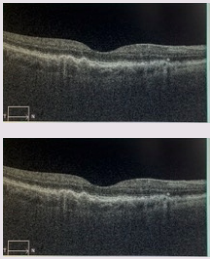
Courtesy of Neta Vision

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nAMD CATCH CASE → **LAST EXAM PRIOR TO ALERT (OD): 2/22/21**

Post Cataract surgery OU

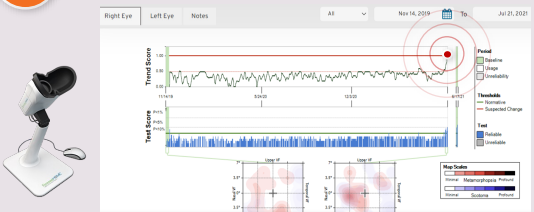
- Patient presents for regularly scheduled dry AMD OU follow up; asymptomatic
- **OCT Findings:** See attached image
- **RTC:** 6 months dry AMD follow up exam and OCT



Courtesy of Notal Vision

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nAMD CATCH CASE **BASELINE 11/19/19: ALERTED 6/13/21**

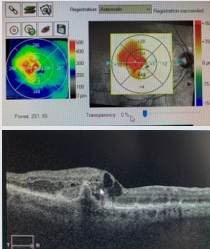


Courtesy of Notal Vision

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nAMD CATCH CASE **EXAM POST-ALERT (OD): 6/18/21**

- **Patient presents for examination following ForeseeHome alert OD**
- **VA sc 20/20⁻³ OD**
- **OCT Findings:** Extensive drusen, PEDs, new CNV with IRF
- **Diagnosis:** AMD Exudative with active CNV OD
- **Plan:** Refer to retina specialist, continue ForeseeHome OS for Dry AMD



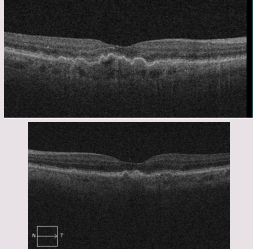
Courtesy of Notal Vision

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nAMD CATCH CASE **EXAM 4TH INJECTION (OD): 9/10/21**

After 4th injection:

- VA sc 20/20 OD
- Patient maintaining vision and 'very grateful'
- **OCT Findings:** See attached images
- Dry Intermediate AMD OS stable; continue monitoring with ForeseeHome



Courtesy of Notal Vision

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PHOTOBIOMODULATION

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Photobiomodulation refers to the therapeutic use of low-level light therapy to improve or restore cellular function in the retina.

Specific selection of wavelengths, fluence, timing, and delivery of PBM is essential to elicit therapeutic benefits at the clinical level.

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Indications for Use

BCVA 20/32-20/70 with early to intermediate dry AMD or non-central GA **AND** no neovascularization or center-involving GA

After about 2 years, the Valeda Light Delivery System treatment provides improved mean VA of approximately 1 line of VA (ETDRS) compared to those not receiving the treatment.

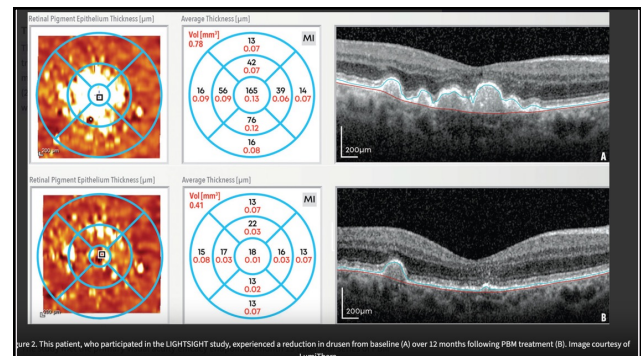
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Treatments are typically applied three times per week for 3-4 weeks, resulting in a series of nine sessions; with repeated series administered every 4 months to maintain benefits over a longer period.:

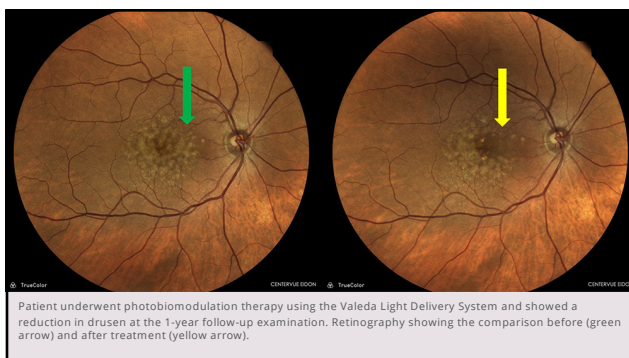
- Treatment frequency:** 3 sessions per week for 3-4 weeks
- Number of sessions per series:** 9
- Treatment interval between series:** Every 4 months



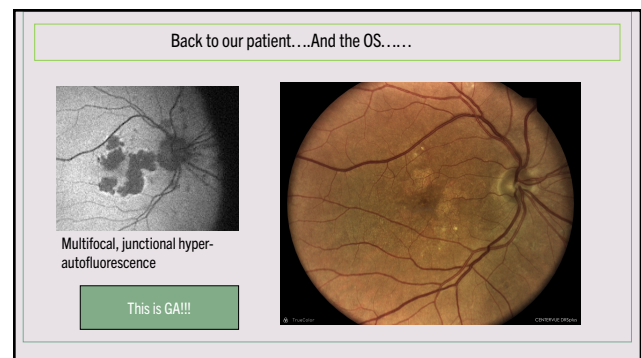
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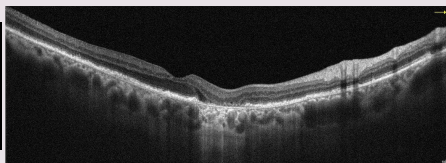


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Let's look at the OCT...



- Subsidence
- Gull wings
- Choroidal hypertransmission

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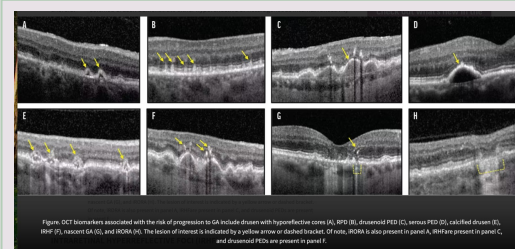
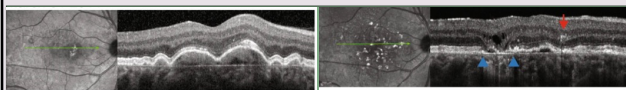


Figure. OCT biomarkers associated with the risk of progression to GA include drusen with hyporeflective cores (A), RPE (B), drusenoid PED (C), vitreous PED (D), calcified drusen (E), RPE (F), nascent GA (G), and RORA (H). The lesion of interest is indicated by a yellow arrow or dashed bracket. Of note, RORA is also present in panel A, vitreous present in panel C, and drusenoid PEDs are present in panel E.

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DOES THIS MAKE SENSE?



The en-face image looks worse, but the OCT looks better???? Or does it???

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FAF Can Help Gauge the Risk for Progression

	Size	Configuration	Location	FAF pattern
Slower Progression	Small	Unifocal	With subfoveal involvement	None
Faster Progression	Medium/Large	Multifocal	Without subfoveal involvement	Diffuse

Images reprinted from Fleckenstein et al. et al. The progression of geographic atrophy secondary to age-related macular degeneration. *Ophthalmology*. 2018;125(3):548-560. © 2018, with permission from the American Academy of Ophthalmology. Fleckenstein et al. et al. *Ophthalmology*. 2018;125(3):548-560.

88

88

TREATMENTS?

89

PAST TREATMENT OF GA...

Home Remedies and Lifestyle Changes for AMD



90

Identify early, refer soon, slow course of disease!

AND NOW....

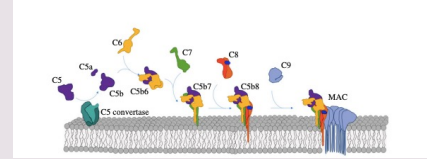


Intravitreal complement inhibitors that SLOW the progression of the disease

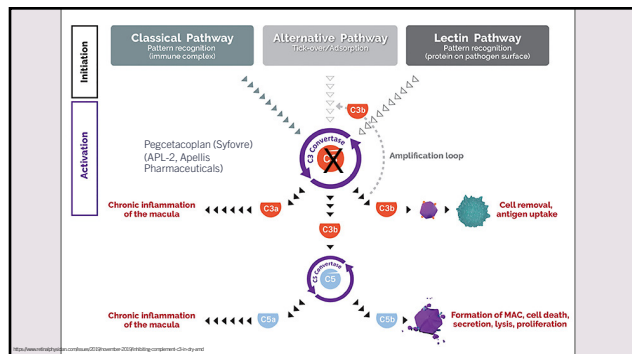
91

WHAT IS THE COMPLEMENT CASCADE?

- Immune response to recognize and remove pathogens
- The cascade is made up of over 50 proteins
- These proteins make up the membrane attack complex

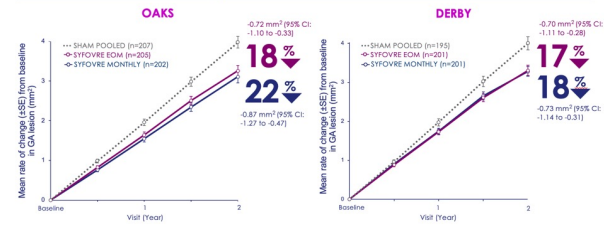


92



93

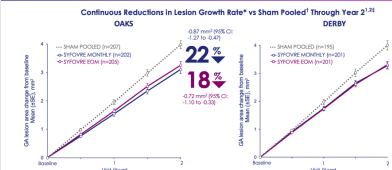
SYFOVRE Achieved Continuous Reductions in Lesion Growth Rate* vs Sham Pooled[†] Through Year 2^{1,2‡}



*Based on a mixed effects model for repeated measures assuming a piecewise linear trend in time with knots at Month 6, Month 12, and Month 18.
[†]SHAM EOM and SHAM Monthly were pooled for analysis.
[‡]Slope for baseline to Year 2 is an average of slope of baseline to Month 6, Month 6 to Month 12, Month 12 to Month 18, and Month 18 to Month 24.
 Confidence interval: 95% standard error.
 1: SYFOVRE (pegcetacoplan injection) [package insert]. Waltham, MA: Apellis Pharmaceuticals, Inc. 2023. 2: Data on file. Apellis Pharmaceuticals, Inc.

94

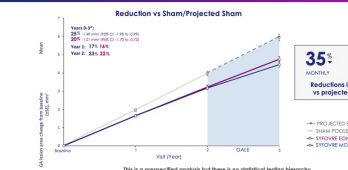
OAKS and DERBY Combined 2-Year Results: Demonstrated Efficacy in Both Monthly and EOM Dosing^{1,2}



*Based on a mixed effects model for repeated measures assuming a piecewise linear trend in time with knots at Month 6, Month 12, and Month 18.
[†]SHAM EOM and SHAM Monthly were pooled for analysis.
[‡]Slope for baseline to Year 2 is an average of slope of baseline to Month 6, Month 6 to Month 12, Month 12 to Month 18, and Month 18 to Month 24.
 Confidence interval: 95% standard error.
 1: SYFOVRE (pegcetacoplan injection) [package insert]. Waltham, MA: Apellis Pharmaceuticals, Inc. 2023. 2: Data on file. Apellis Pharmaceuticals, Inc.

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GALE 1-Year Up to 35% Reductions in Lesion Growth Rate in Year 3 With Increasing Effect Over Time



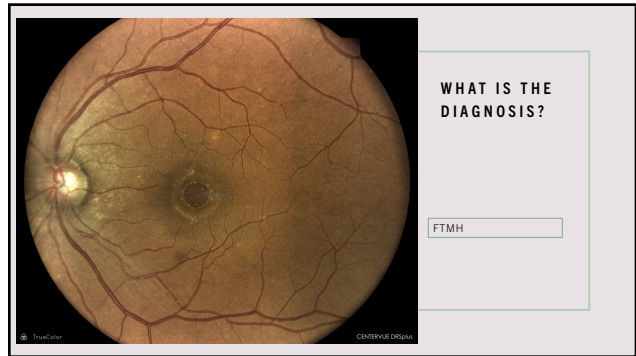
*Based on a mixed effects model for repeated measures assuming a piecewise linear trend in time with knots at Month 6, Month 12, and Month 18.
[†]SHAM EOM and SHAM Monthly were pooled for analysis.
[‡]Slope for baseline to Year 3 is an average of slope of baseline to Month 6, Month 6 to Month 12, Month 12 to Month 18, and Month 18 to Month 24.
 Confidence interval: 95% standard error.
 1: SYFOVRE (pegcetacoplan injection) [package insert]. Waltham, MA: Apellis Pharmaceuticals, Inc. 2023. 2: Data on file. Apellis Pharmaceuticals, Inc.

96

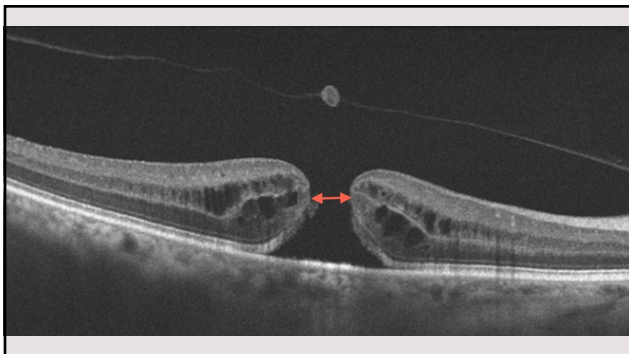
PATIENT PRESENTATION

- 75-year-old female
- Slowly progressive decrease in vision OS; spot in central vision
- Pseudophakic OU
- BCVA measured 20/25 OD and **20/400 OS**

103



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105

SIZE OF THE DEFECT

What is the size of the aperture?
(Size critical for surgical outcome)

Small: Full thickness defect; $< 250 \mu\text{m}$

Medium: Full thickness defect; $>250 \mu\text{m}$ and $<400 \mu\text{m}$

Large: Full thickness defect; $>400 \mu\text{m}$

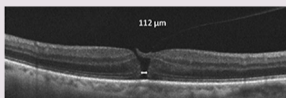
Measure at narrowest point on OCT
Parallel to RPE

106

SIZE OF DEFECT

Small: Full thickness defect; $< 250 \mu\text{m}$

- ❖ Visual acuity may be relatively good
- ❖ Very high probability of success with vitrectomy

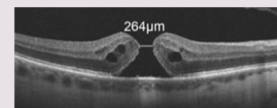


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SIZE OF DEFECT

Medium: Full thickness defect; $>250 \mu\text{m}$ and $<400 \mu\text{m}$

- ❖ High probability of success with vitrectomy surgery

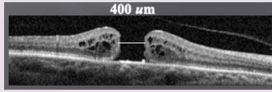


108

SIZE OF DEFECT

Large: Full thickness defect; $>400\text{ }\mu\text{m}$

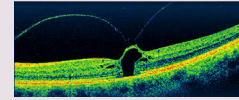
- ❖ *Less probability of successful closure with vitrectomy surgery*



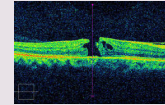
109

PRESENCE OR ABSENCE OF VMT

Primary: VMT present



Secondary: VMT absent, secondary to pre-existing or concurrent disease



Examples: Trauma, myopia, macular edema, macular schisis, CNV, surgery, ERM

110

MANAGEMENT

Full-thickness macular hole (FTMH)

- An interruption in all retinal layers from the internal limiting membrane to the photoreceptors.
- FTMHs are further classified as either with or without VMT; by size (small = $<250\text{ }\mu\text{m}$, medium = $250\text{ to }400\text{ }\mu\text{m}$, large = $>400\text{ }\mu\text{m}$); and primary versus secondary.

Surgery involves a pars plana vitrectomy procedure with tamponade. This can be done with or without peeling of the internal limiting membrane.

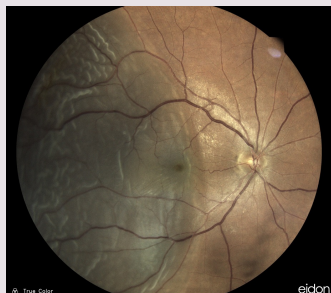
111

PATIENT PRESENTATION

- 35-year-old male
- **Can't see OD x 1 month; thought it would go away on its own**
- **Had flashes and floaters which subsided OD**
- BCVA measured **20/400 OD** and 20/20 OS

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WHAT IS THE DIAGNOSIS?



Macula off RD

113

WHAT IS THE DIAGNOSIS?



114

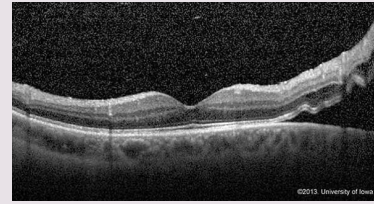
WHAT IS THE DIAGNOSIS?



Macula on RD

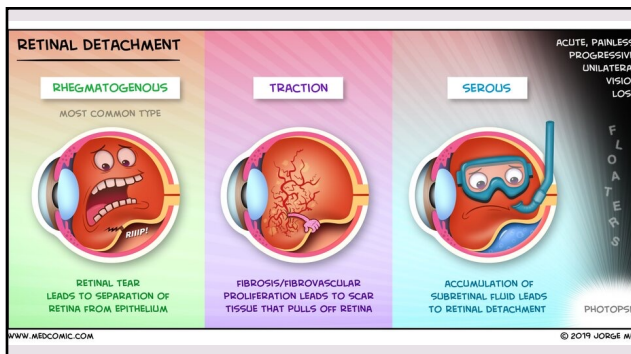
115

WHAT IS THE DIAGNOSIS?



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MANAGEMENT

• Macula off

- Some recommend referring patients with recent macula-off retinal detachments (RDs) **as soon as possible**, ideally within **48 to 72 hours of central vision loss**. This is because studies suggest that earlier surgery may lead to similar outcomes to macula-on RDs, which are historically considered to require surgery on the same day. However, others say that surgery doesn't need to be an emergency within the first 24 hours.

• Macula on

• IMMEDIATE REFERRAL

118

PATIENT PRESENTATION

- 29-year-old male
- 4.50 DS OU
- Longstanding floaters OU
- No flashes
- 20/20 OD and OS

119

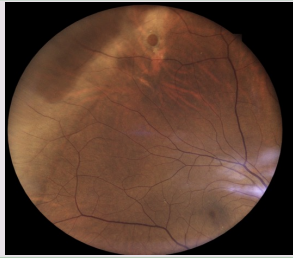
WHAT IS THE DIAGNOSIS?



Atrophic holes in lattice

120

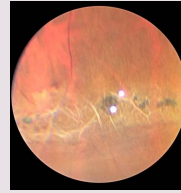
WHAT IS THE DIAGNOSIS?



Atrophic hole

121

Lattice degeneration is a common peripheral retinal thinning condition. It usually appears in the far edge of the retina and is often found incidentally during a dilated eye exam. It occurs in roughly 6–10% of people and is more common in people who are nearsighted.



122

Atrophic retinal holes are full thickness retina breaks often existing in the peripheral retina. They are the result of atrophic changes/thinning within the sensory retina that is not induced by vitreous adhesions. Often, these lesions are found in association with lattice degeneration.


<https://doctorib.org/ophthalmology/principles/05.html>

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CLINICAL PEARL

Asymptomatic atrophic or operculated retinal breaks rarely need treatment.

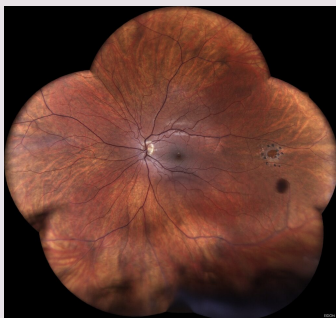
An eye that:

- ❖ Has atrophic round holes within lattice lesions
- ❖ Has minimal subretinal fluid without progression or
- ❖ Lacks evidence of posterior vitreous detachment (PVD)

Does not require treatment

Some studies suggest that prophylactic laserpexy may be considered for eyes with retinal holes when there are active symptoms, when there is accompanying subretinal fluid, or when a retinal detachment already exists in the patient's fellow eye.

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What is the diagnosis?

Operculated retinal hole

126

OPERCULATED HOLES

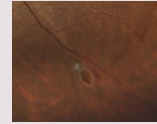
- **Operculated retinal holes** are small full-thickness breaks in the retina where a tiny piece of retinal tissue ("operculum") has been pulled free, usually by vitreous traction as the eye's gel changes with age.
- They're often found incidentally and may be low-risk once the pulling force has released, but they can sometimes allow fluid under the retina and lead to a retinal detachment. Risk is higher if there are symptoms, surrounding fluid, multiple breaks, high myopia, prior detachment in the other eye, or recent eye trauma.



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OPERCULATED HOLES

With time, the operculum contracts and deteriorates because of loss of retinal blood supply. In many cases, it is observed to be smaller than the underlying retinal defect. The development of an operculated retinal hole will most likely be a sudden event, rather than a progressive process occurring during the formation of a PVD. In addition, vitreoretinal tufts commonly precede the operculated retinal hole.



128

MANAGEMENT

Patients may be symptomatic in the initial phase of an operculated retinal hole development but become asymptomatic once the operculum is fully formed and traction is released. The absence of vitreoretinal traction after the operculum becomes free floating translates into a very low risk for the development of a RRD. **No treatment is necessary.**

If there is persistent vitreoretinal traction, an operculated retinal hole can lead to an RRD. However, fewer than 1% of asymptomatic operculated retinal holes develop into RDs. Treatment is considered for fresh operculated holes that are large and superiorly located, or for cases associated with ominous signs, such as a vitreous hemorrhage.

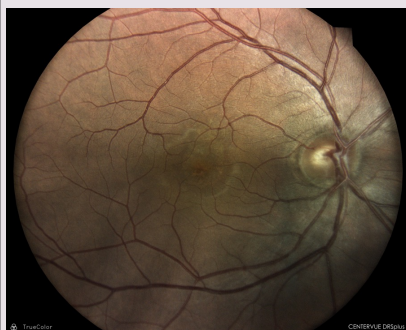
129

PATIENT PRESENTATION

- 30-year-old male
- Weight-lifter; **Type A personality; under a lot of stress at work**
- **Recent decrease in vision OD (getting worse over past month)**
- BCVA OD 20/40; OS 20/20

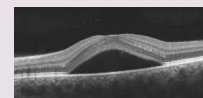
130

WHAT IS THE DIAGNOSIS?



131

Central serous chorioretinopathy is a retinal disorder characterized by localized serous detachment of the macula. It is secondary to retinal pigment epithelial decompensation and choroidal vascular changes.



132

MANAGEMENT

The majority of cases of CSCR resolve spontaneously:

- *Observation is done for 3 months
- *Reduction of stress
- *Stoppage of steroids or other predisposing factors

80% cases resolve spontaneously.

- Laser
- PDT
- Anti-VEGF
- Anti-corticosteroids

Patients with CSCR commonly have endogenous hypercortisolism, thus drugs targeting cortisol pathways might be effective.

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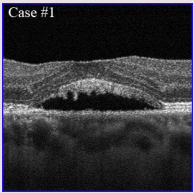
INDICATIONS FOR EARLY INTERVENTION

- *Visual demand for profession (pilot) or the patient for early recovery
- *Recurrent disease
- *Severe decline of vision in the other eye due to chronic CSCR

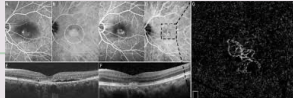
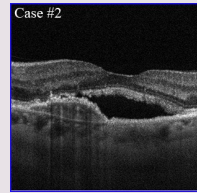
134

WHAT WE DON'T WANT TO HAPPEN!

Case #1



Case #2



135

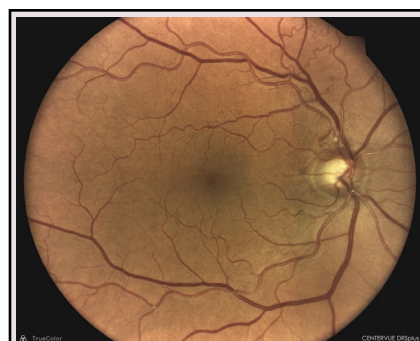
PATIENT PRESENTATION

- 72-year-old female
- **H/O stroke one year prior**
- Longstanding HTN, arteriosclerosis
- No visual complaints
- OD 20/20; OS 20/20

136

WHAT IS THE DIAGNOSIS?

Retinal Plaques



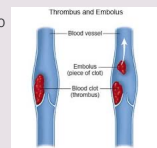
137

WHAT IS A RETINAL PLAQUE?

Plaques are created if plaque from in your body breaks free and blocks a blood vessel in your retina

When the clot travels from the site where it formed to another location in the body, it is called an embolism.

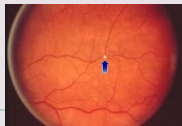
Retinal ischemia can occur if the embolus does not dislodge and blocks perfusion or retinal blood in the area



138

DIFFERENTIAL DIAGNOSIS

- **Cholesterol emboli/Hollenhorst plaque.**
 - Highly refractile, crystal-like emboli that typically are seen at arteriole bifurcations.
 - The emboli can be visually asymptomatic, because they often do not cause a significant obstruction of the retinal arteriole.
 - Also known as Hollenhorst plaques, cholesterol emboli originate from atheromatous lesions in the ipsilateral carotid artery or aorta.



139

DIFFERENTIAL DIAGNOSIS

- **Fibrin platelet emboli.**
 - Dull white in appearance and often present as long, smooth emboli simulating a plug in the retinal arteriole.
 - They are most commonly associated with carotid thrombosis.



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DIFFERENTIAL DIAGNOSIS

- **Calcific emboli.**
 - Non-scintillating, white in appearance, and typically present in the central retinal artery due to their large size.
 - Such entities may remain in the retinal vasculature permanently, because they do not dissolve.
 - They are associated with heart valve or aorta calcification. Transesophageal echocardiogram is needed to confirm the diagnosis.



141

Retinal emboli are found within retinal arterioles

- Most commonly stem from vascular diseases
- Often incidental finding on fundus examination

Arise from carotid arteries, coronary arteries, or cardiac valves

- 80% cholesterol: Hollenhorst

Composition of emboli will dictate migration and resolution

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WHAT YOU NEED TO KNOW!

❖ Risk factors for retinal emboli:

- ❖ Older age
- ❖ Male sex
- ❖ Hypertension
- ❖ Cholesterol levels
- ❖ Coronary artery disease
 - ❖ h/o bypass graft
- ❖ Smoking

143

MANAGEMENT

- Urgent workup is indicated for **SYMPTOMATIC** plaques

- *Unilateral vision loss
- * Amaurosis Fugax
- *Total loss of vision

- *Visual Scotoma

OR: *headaches, numbness in face, arm, legs, or one side of body

- *dizziness
- *difficulty with balance or speaking
- *fainting

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MANAGEMENT

- Urgent workup is indicated for **SYMPTOMATIC** plaques

Urgent embolic evaluation including carotid ultrasound analysis is indicated, as approximately 25% may have substantial carotid artery stenosis. In patients with moderate to severe carotid artery stenosis, carotid endarterectomy can substantially reduce the risk of subsequent hemispheric cerebral vascular accident

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MANAGEMENT

As Hollenhorst plaques are common characteristics of an artery occlusion, the presence of retinal ischemia or infarction warrants urgent management.



Prompt referral to nearest stroke center!

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MANAGEMENT

- Approximately 75% of plaques seen in ophthalmic practice are asymptomatic

As high as 12% of patients with asymptomatic plaques are at risk of cerebrovascular events and 22% have significant carotid artery stenosis (>50%)

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DIAGNOSTIC TESTING

- ❖ Carotid doppler ultrasound
- ❖ Transesophageal echocardiography (calcific plaque)
- ❖ Computed tomographic angiography and/or MRA (degree of carotid stenosis)

Regardless of disease severity, sending for carotid workup is safe and is a justified approach to managing these patients. Always communicate with the patient's primary care provider.

148

PATIENT PRESENTATION

- 17-year-old female
- History of **blunt trauma to her left eye** one day prior
- She went to the ER the day of the injury and got imaging, but no fractures were found
- She reported photophobia, eye pain, eyelid tenderness and blurry vision in the left eye since the incident occurred
- She denied flashes, floaters, diplopia, or headaches.
- BCVA measured 20/20D and 20/20 OS

149

WHAT IS THE DIAGNOSIS?



Commotio Retinae

150

Comotio retinae refers to traumatic retinopathy secondary to direct or indirect trauma to the globe. Retinopathy may be present at areas of scleral impact (coup) and/or distant sites (contrecoup) including the macula. Comotio retinae in the posterior pole is also referred to as Berlin's edema.



151

MANAGEMENT

Patients suffering substantial ocular trauma with comotio retinae should be followed with serial eye exams to evaluate for any additional treatable conditions. As comotio of macula resolves, partial or full thickness macular holes can develop.

There is no **approved or commonly used medical treatment for comotio retinae**. However, in cases that do not resolve spontaneously, high dose IV steroids have been anecdotally shown to reduce retinal swelling and improve visual acuity.

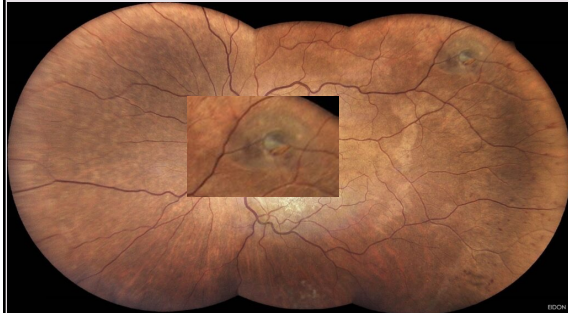
152

PATIENT PRESENTATION

- 30-year-old female
- **High myope**
- **New onset flashes, floaters, hazy vision OS**
- BCVA measured 20/20D and 20/20 OS

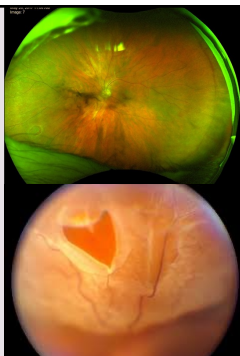
153

WHAT IS THE DIAGNOSIS?



154

- Horseshoe tears, also referred as flap or U-shaped tears, are full thickness breaks in the neurosensory retina that occur secondary to vitreo-retinal traction. The apex of the flap is pulled anteriorly into the vitreous cavity while the base remains attached to the retina.



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MANAGEMENT

A symptomatic retinal horseshoe tear (**horseshoe retinal break**) should generally be referred to a retina specialist **the same day**, as it is considered an ophthalmic urgency.

If same-day evaluation is unavailable:

- The patient should generally be seen **within 24 hours**.
- The referring clinician should communicate directly with the retina specialist's office rather than simply providing a routine referral.

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MANAGEMENT

Symptomatic retinal tears:

- Symptomatic retinal horseshoe tears and persistent vitreoretinal traction can progress to a retinal detachment in 33 to 55 % of cases.

Prompt retinopexy reduces that risk to **well under 10%**, often around **2–5%**, although exact rates vary among studies.

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MANAGEMENT

Asymptomatic tears:

Treating asymptomatic retinal horseshoe tears is less straight forward. Approximately 5% of these patients will progress to a retinal detachment.

Asymptomatic atrophic holes or some **asymptomatic operculated holes** often do **not** require urgent referral. An **asymptomatic horseshoe tear** is still usually referred promptly (often within a few days), but a **symptomatic horseshoe tear** warrants **same-day evaluation** because of the substantially higher risk of retinal detachment.

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THANK YOU!!

rjulie@nova.edu

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