

A Swept-source Optical Coherence Tomography Study of the Spectrum of Laser Pointer Maculopathy

Mahmoud Leila, MD
Professor of Ophthalmology
Retina Department
Research Institute of Ophthalmology

Disclosure

The authors have no conflict of interest

Handheld Laser Pointers

A lurking menace

- An alarming surge in macular injuries caused by laser pointers
- Injury is accidental, deliberate, or self-inflicted

Lee et al. Retina 2014; Raoof et al. Am J Ophthalmol 2016; Birtel et al. Dtsch Arztebl Int 2017

Handheld Laser Pointers

A lurking menace

- Ease of access, lack of public awareness
- Mislabeling of laser class & output power
- Delayed diagnosis (majority of patients are children)
- Misdiagnosis (macular dystrophies)

Lee et al. Retina 2014; Raoof et al. Am J Ophthalmol 2016; Birtel et al. Dtsch Arztebl Int 2017; Da Silva et al. Am J Ophthalmol 2019

Laser Hazard Classes

	Laser class	Laser product hazard	Product example
	1, 1M	No hazard	Laser printer, CD, DVD players
	2, 2M	Hazardous only with optical aids	Bar code scanners
	3R	Eye hazard (Direct viewing 5mW for 10 seconds)	Laser pointers
	3B	Immediate skin & eye hazard (direct viewing)	Laser light show projector Industrial & research lasers
	4	Immediate skin & eye hazard (direct or reflected beam)	Laser light show projector Industrial, & research lasers Medical device lasers

Laser products and instruments. Food and Drug Administration (FDA)

Pathogenesis of retinal damage

Laser – related factors

- WL, output power, proximity of the beam to the eye

Ocular – related factors

- Clarity of media, fundus pigmentation, natural protective mechanisms (aversion reflex, miosis, blinking)

Raoof et al. Am J Ophthalmol 2016; Wu et al. Surv Ophthalmol 2006; Perez-Montaña et al. Doc Ophthalmol 2019; Verma et al. Ophthalmol Clin North Am 2001

Role of UHR-OCT

- In vivo visualization of the retinal microstructure
- Detection of the temporal evolution of LPM from acute through chronic stages
- Depicts a characteristic morphology that distinguishes LPM from other macular diseases

Comander et al. Am J Ophthalmol 2011; Dhrami-Gavazi et al. Int J Retin Vitre 2015

RESEARCH

Open Access



A swept-source optical coherence tomography study of the spectrum of laser pointer maculopathy

Magdy Moussa^{1*}, Mahmoud Leila², Mohammed Fotouh Elashri³ and Ahmed Osama Hashem¹

Moussa M, et al. Int J Retin Vit 2025

Patients and Methods

- A retrospective consecutive case series
- Inclusion criteria: visual symptoms + macular lesion + H/O exposure to laser-emitting devices

Results

- 31 eyes of 22 patients
- Male gender: (77%)
- Mean Age: 18yrs
- Mean baseline BCVA: 0.4
- Mean FUP period: 9.6 months

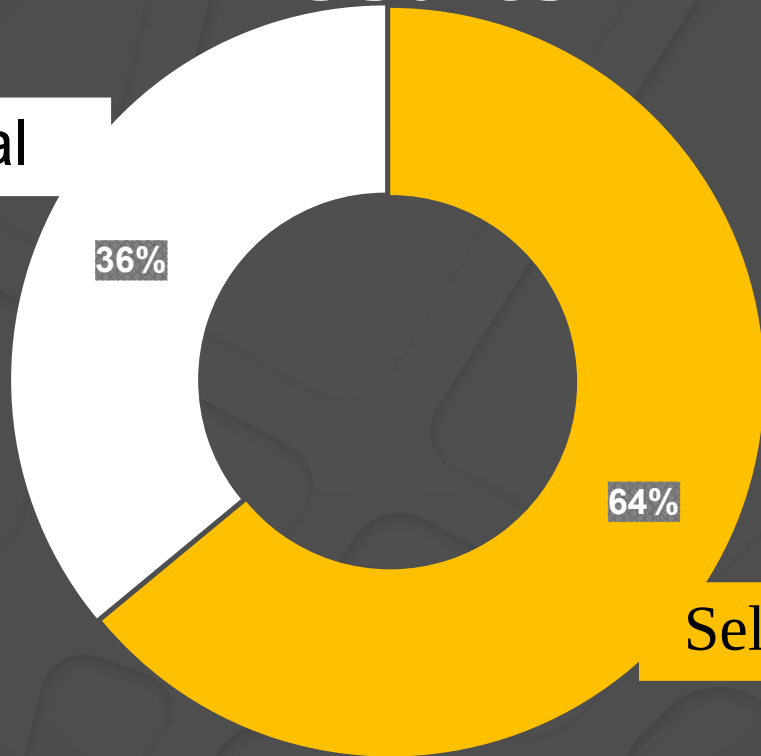
Results

Accidental

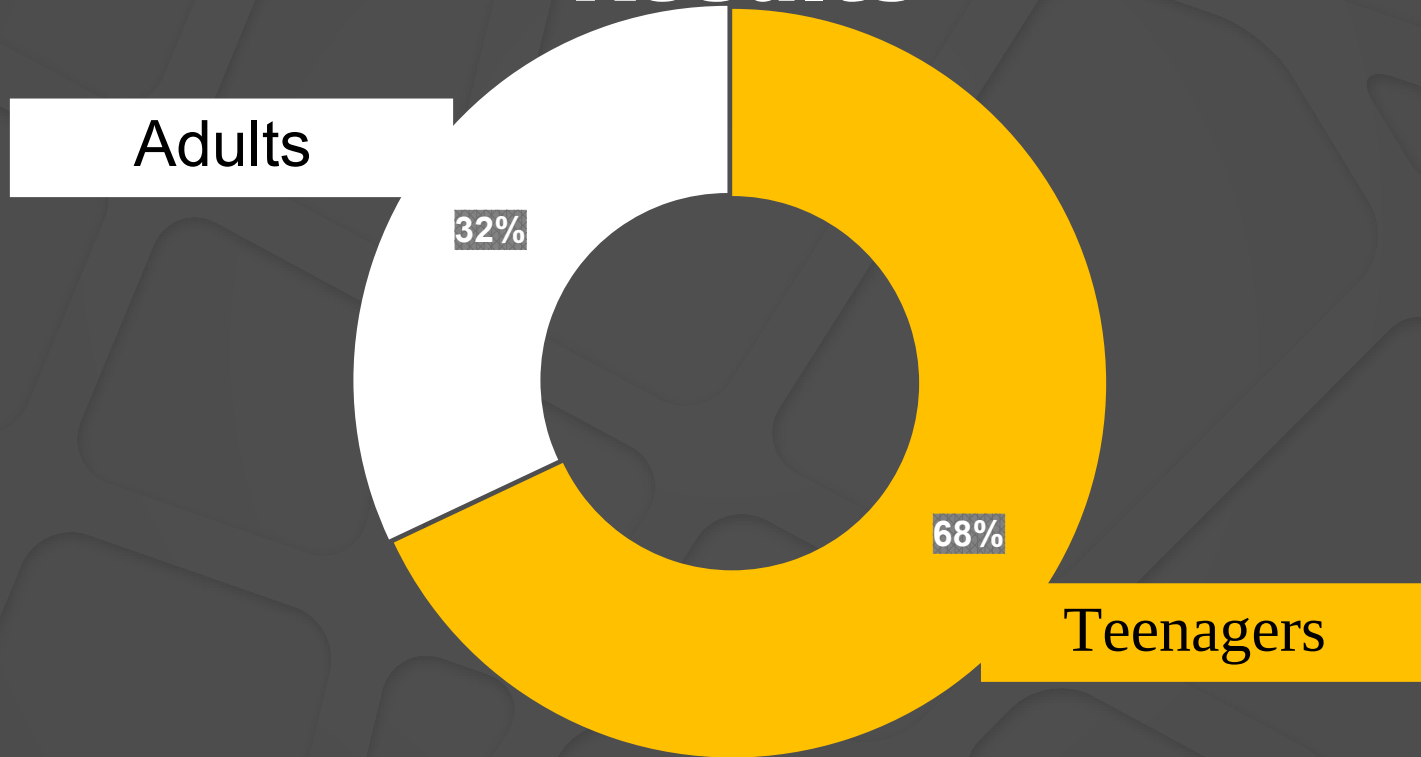
36%

64%

Self-inflicted



Results



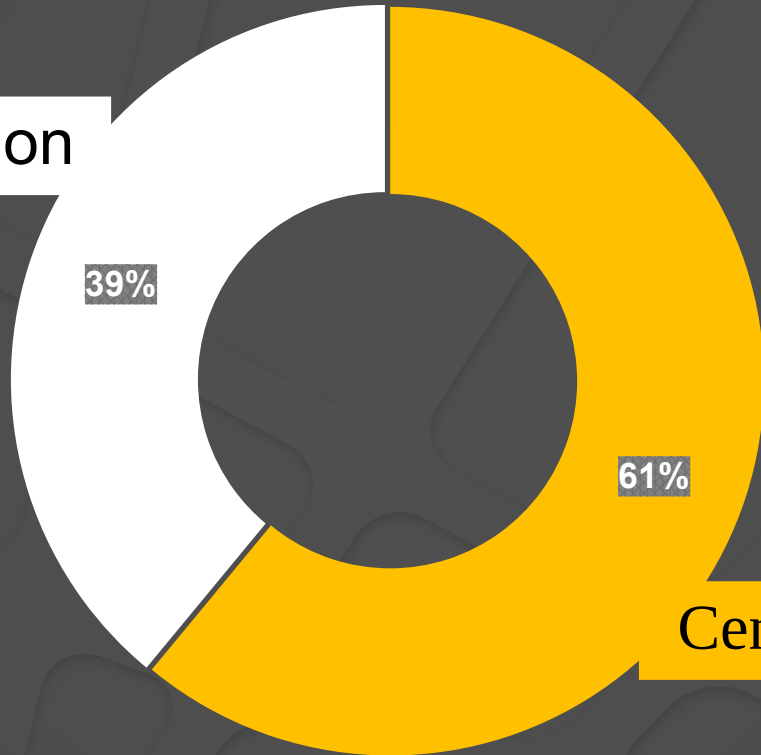
Results

Blurred vision

39%

61%

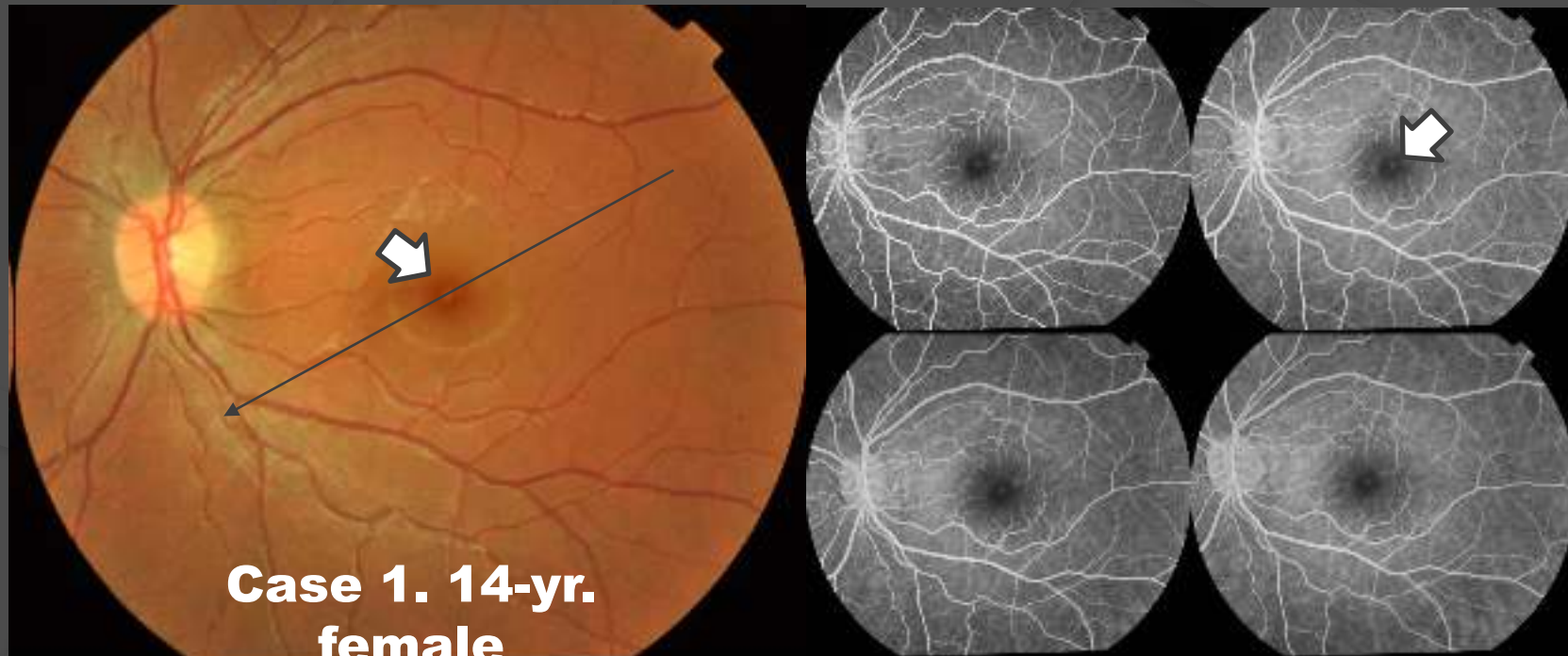
Central scotoma



Results

Case Presentation

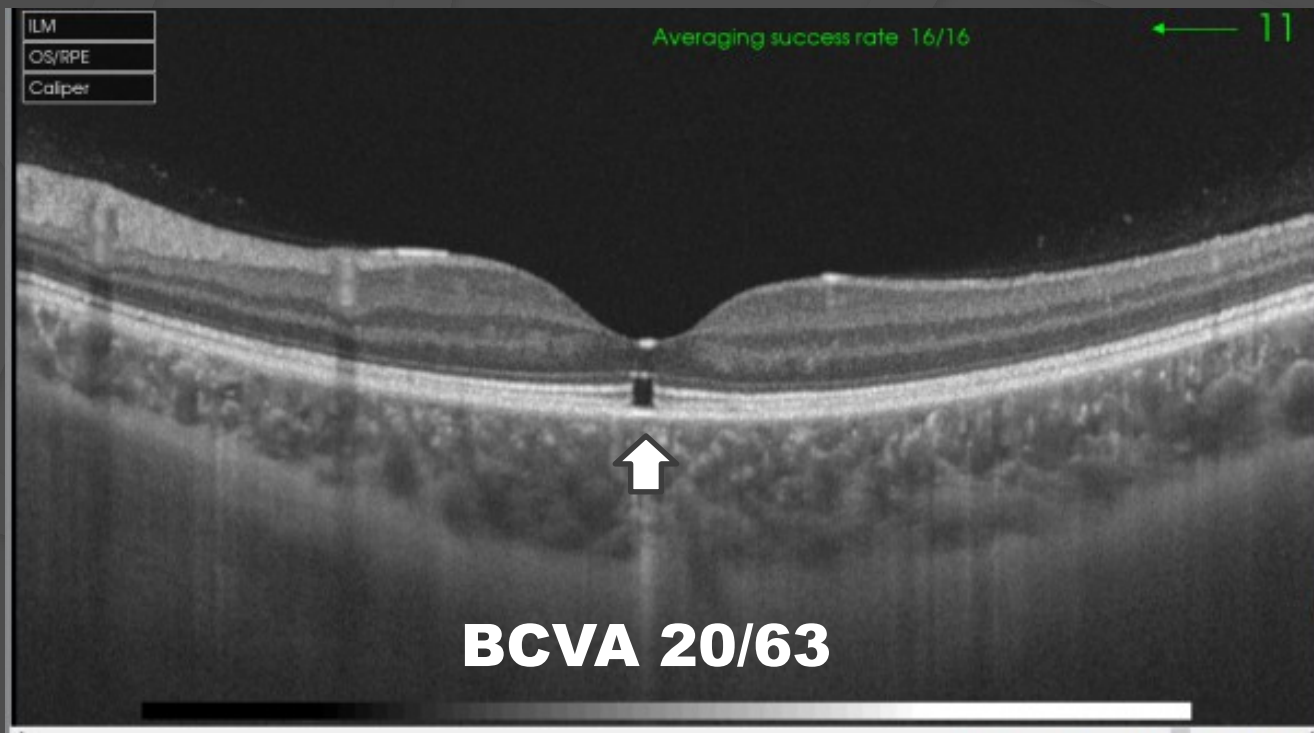
Focal Disruption of the Outer



**Case 1. 14-yr.
female**

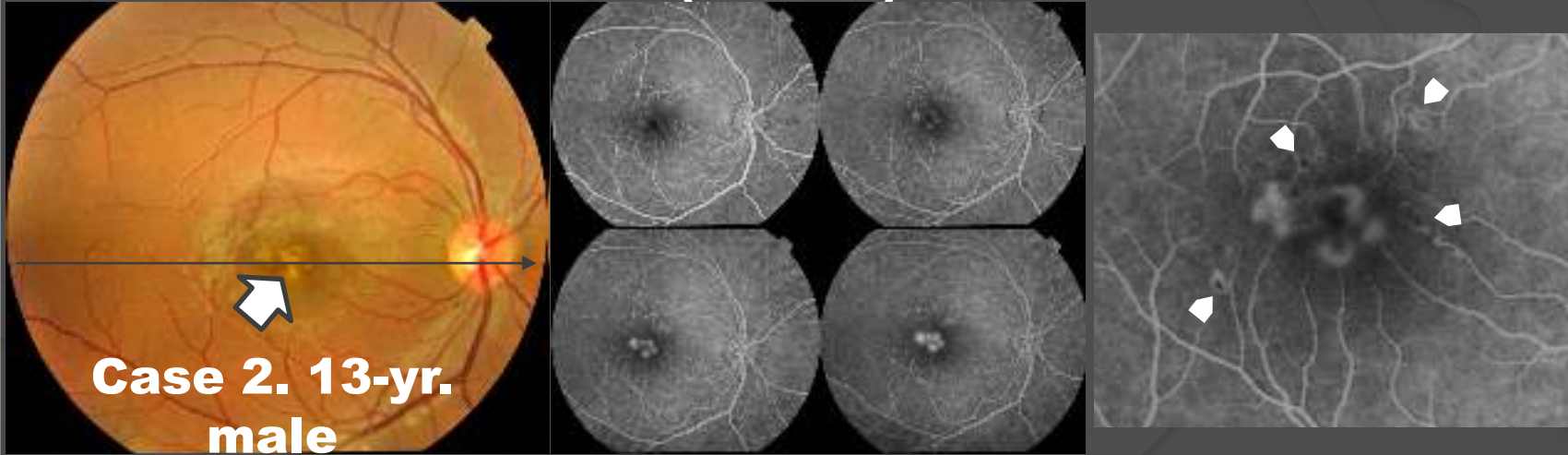
Moussa M, et al. 2025

Focal Disruption of the Outer



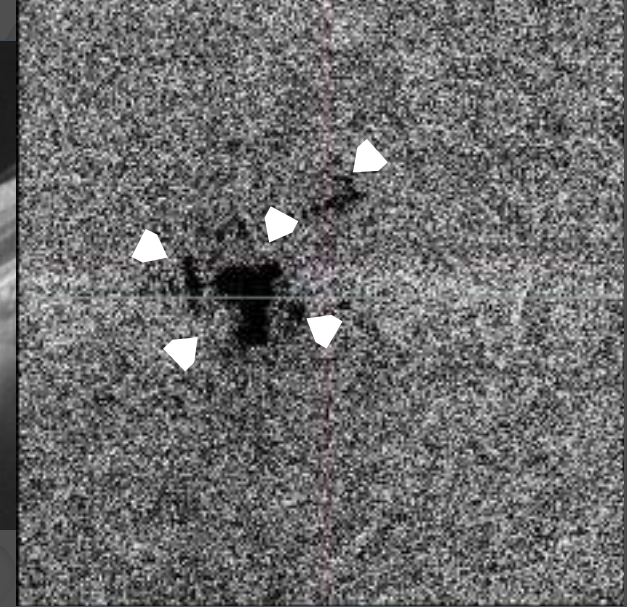
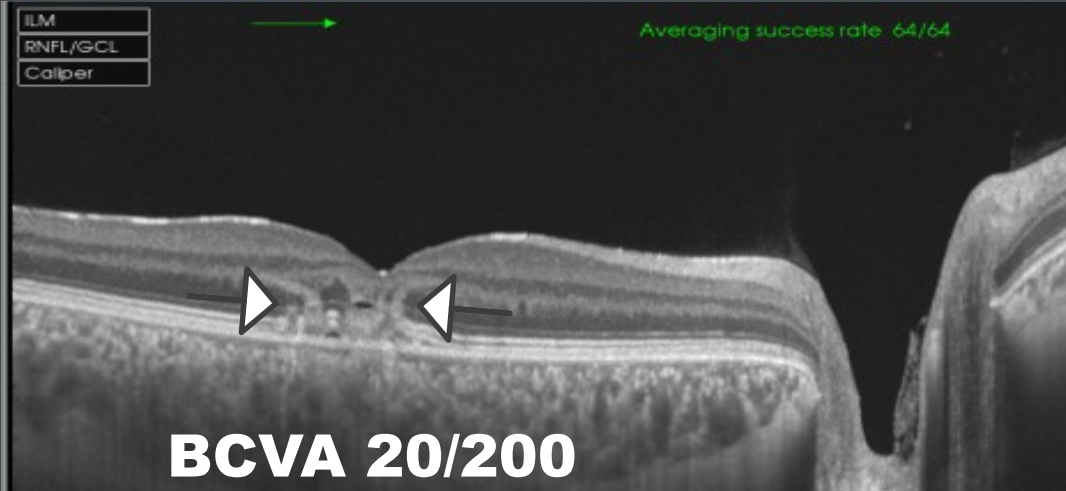
Moussa M, et al. 2025

Angular sign of Henle layer hyperreflectivity (ASHH)



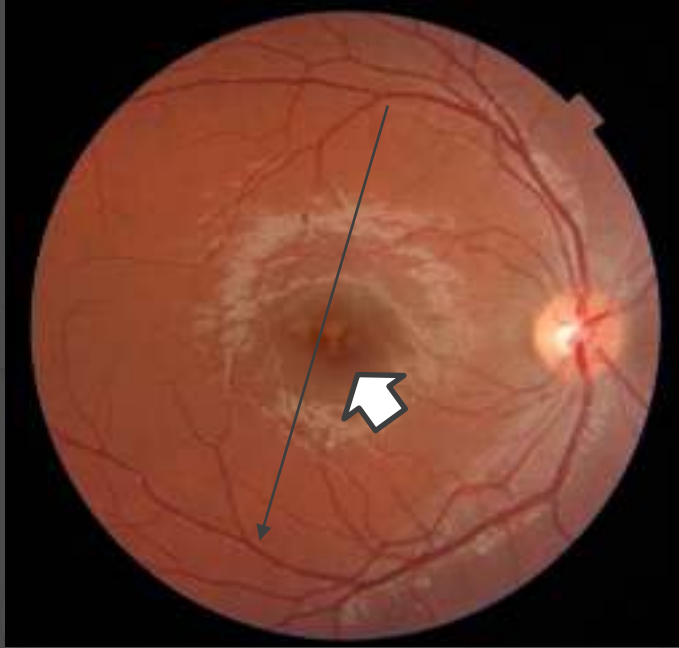
Moussa M, et al. 2025

Angular sign of Henle layer hyperreflectivity (ASHH)



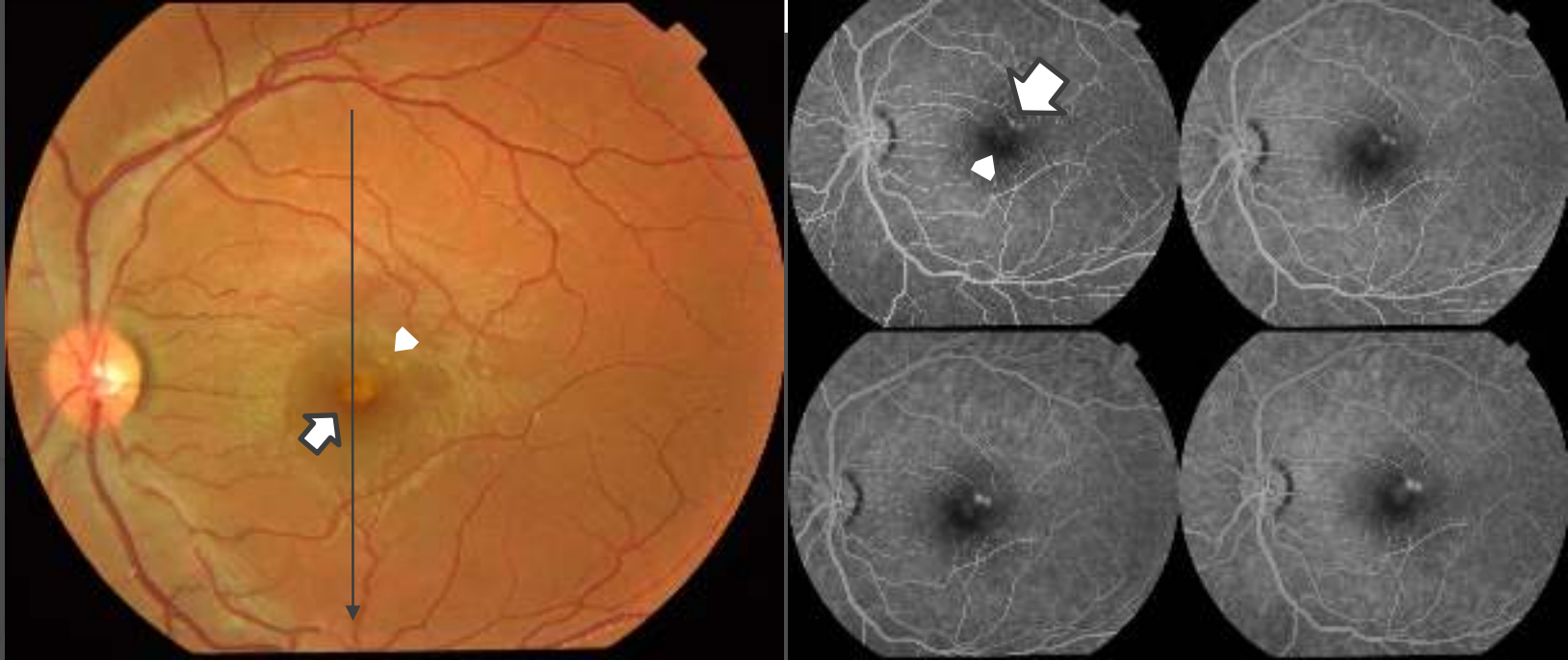
Moussa M, et al. 2025

Angular sign of Henle layer hyperreflectivity (ASHH) (1 month later)



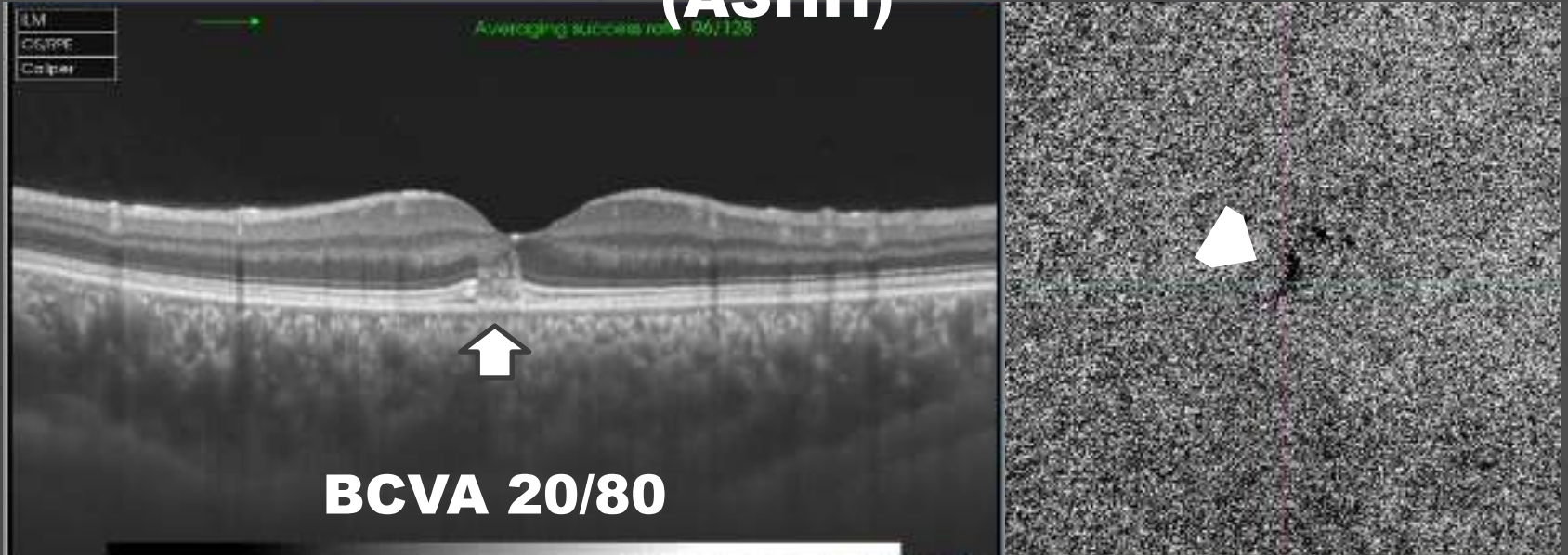
Moussa M, et al. 2025

Angular sign of Henle layer hyperreflectivity



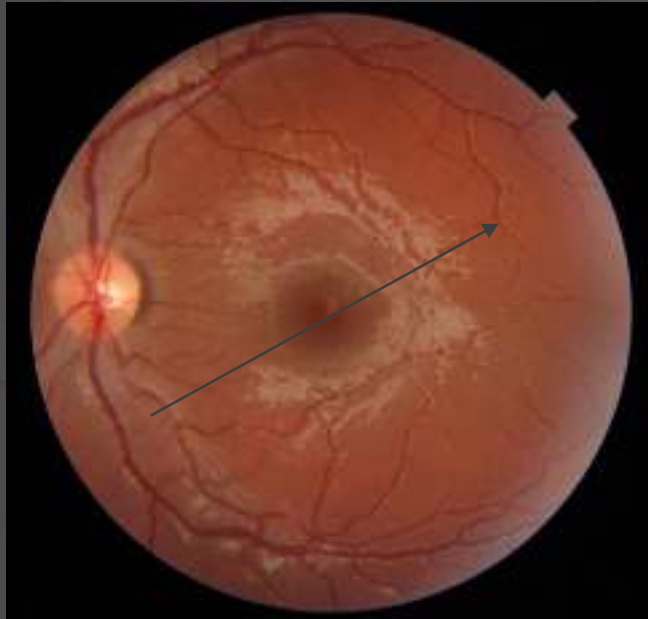
Moussa M, et al. 2025

Angular sign of Henle layer hyperreflectivity (ASHH)



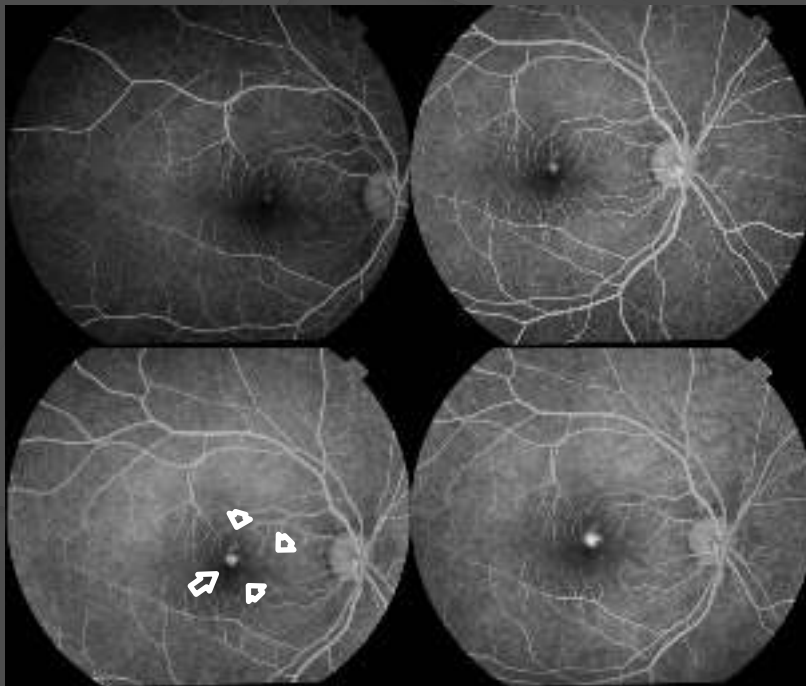
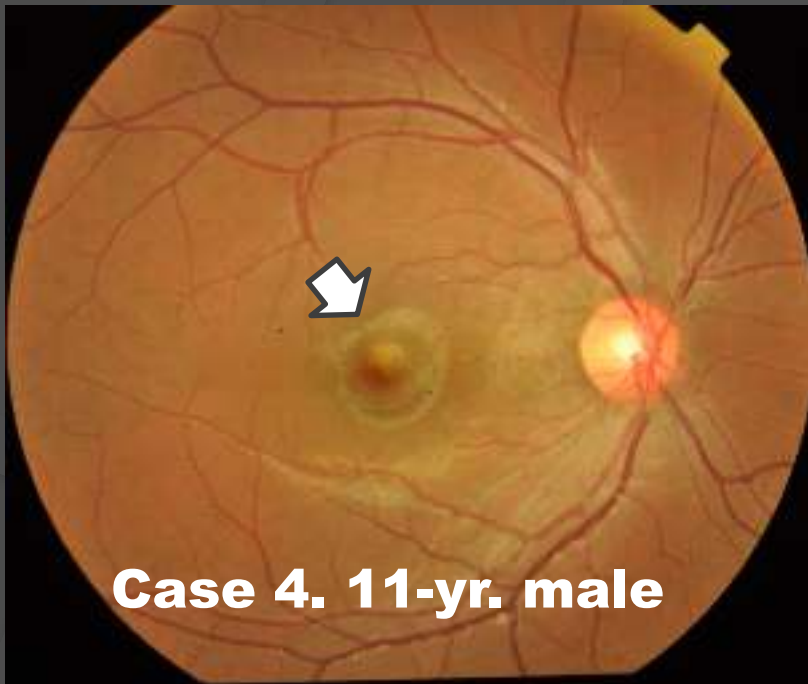
Moussa M, et al. 2025

Angular sign of Henle layer hyperreflectivity (ASHH) 1 month later



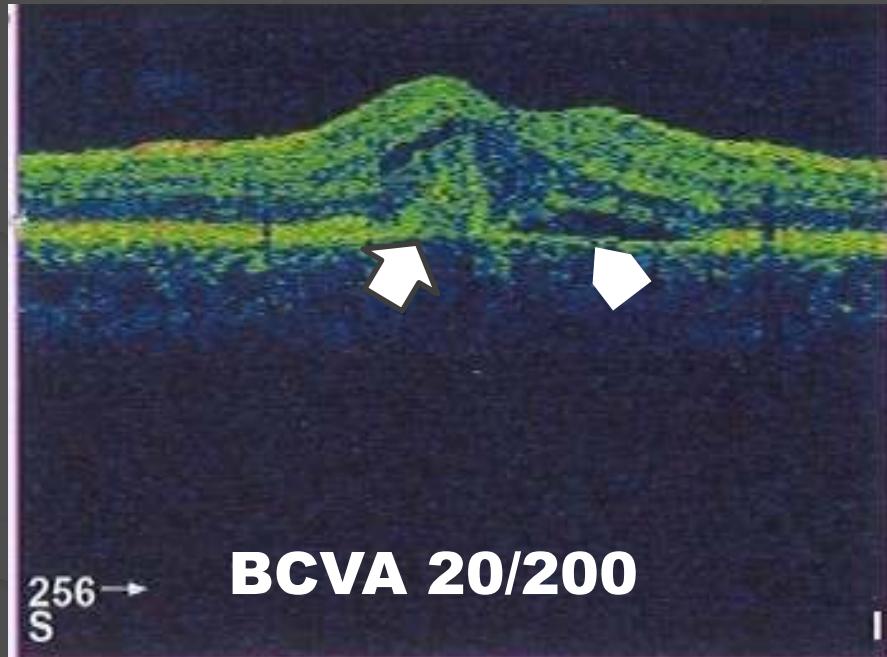
Moussa M, et al. 2025

Secondary CNV



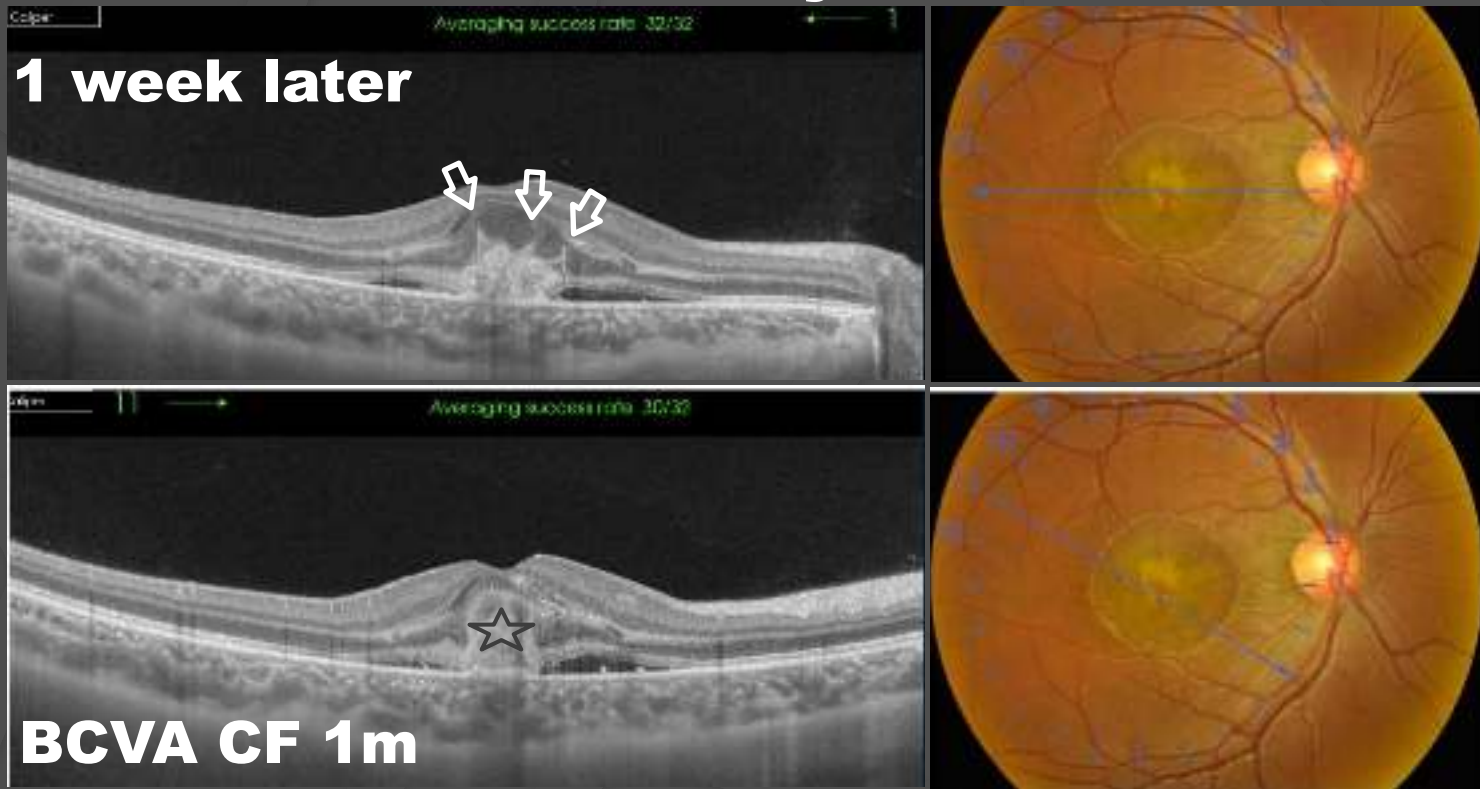
Moussa M, et al. 2025

Secondary CNV



Moussa M, et al. 2025

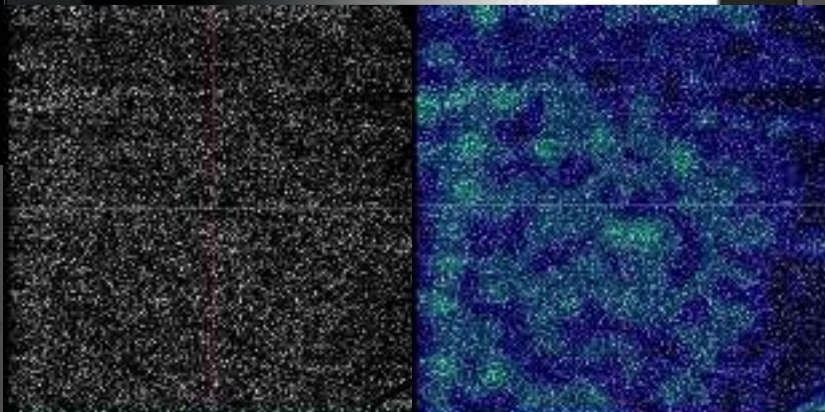
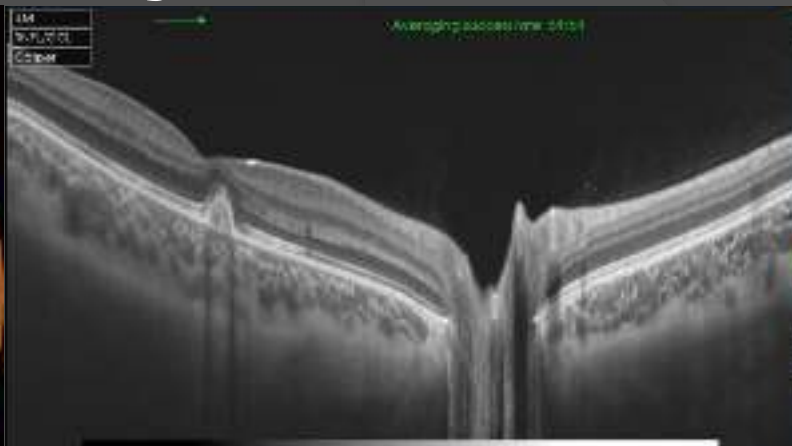
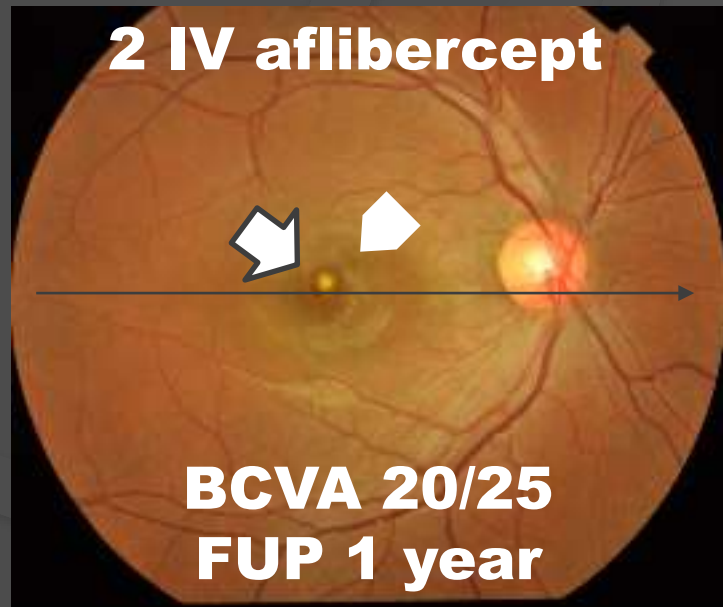
Secondary CNV



Moussa M, et al. 2025

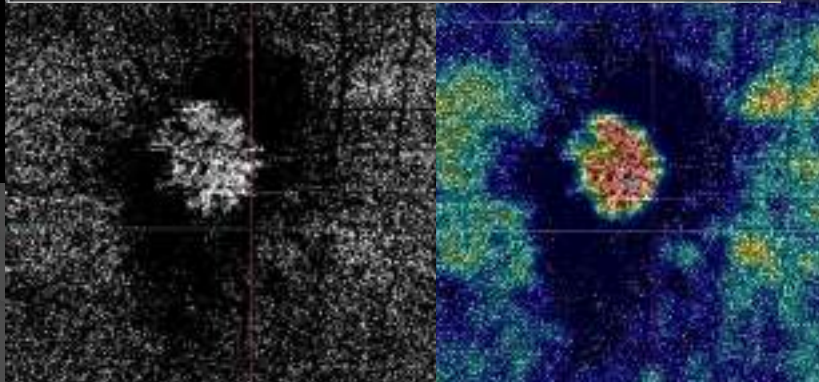
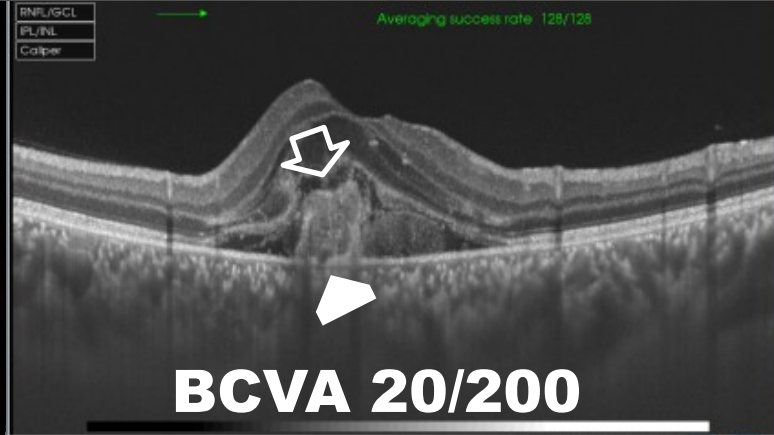
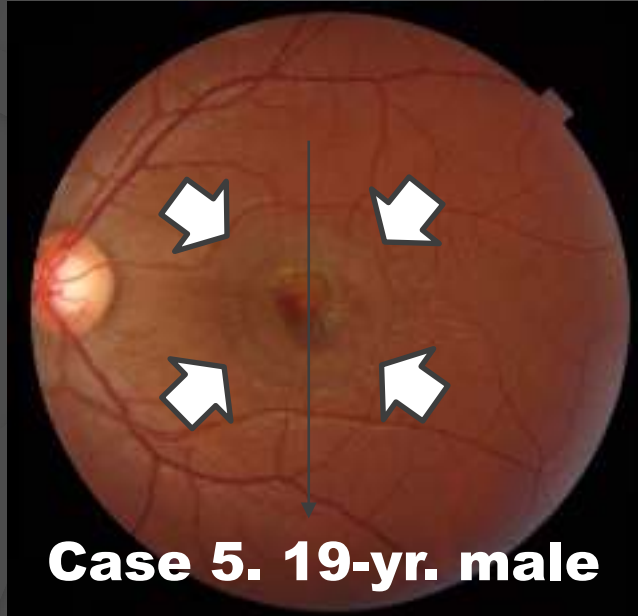
Secondary CNV

2 IV aflibercept



Moussa M, et al.
2025

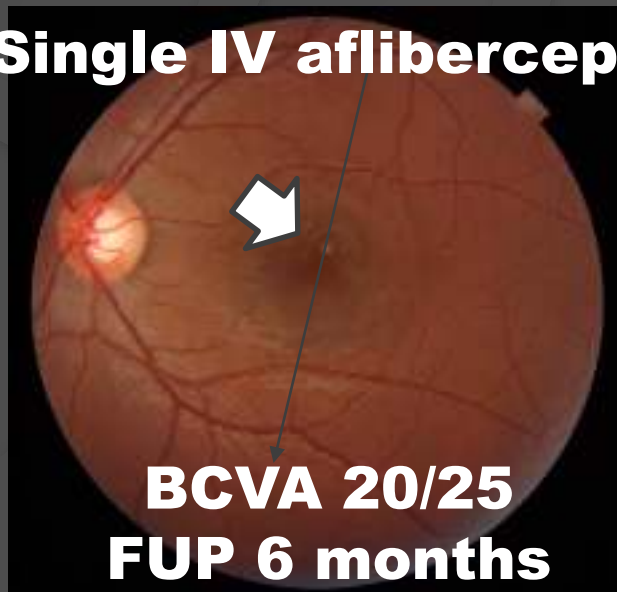
Secondary CNV



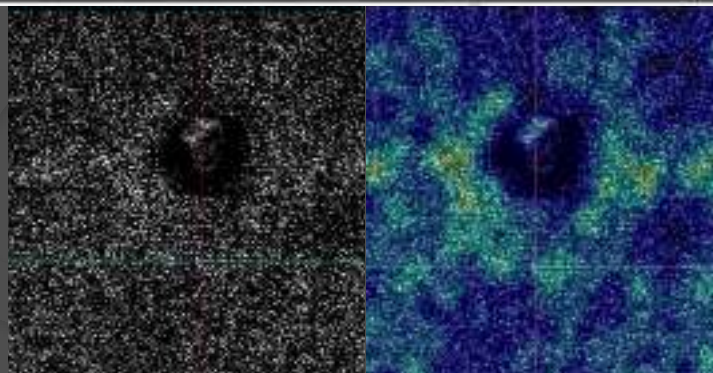
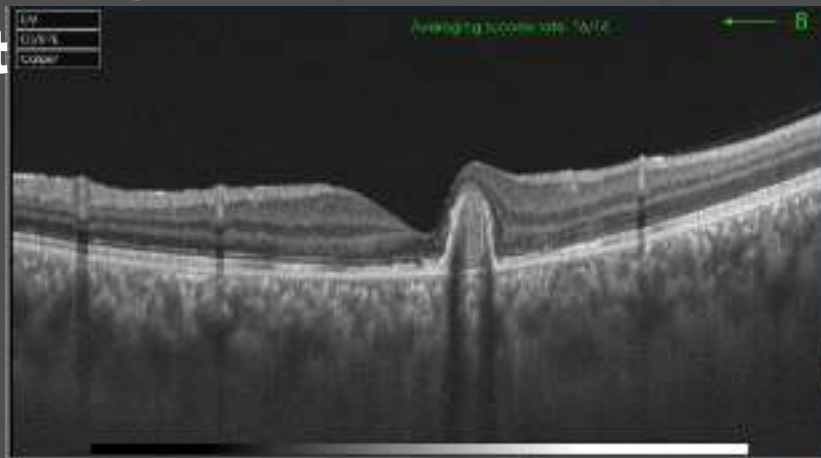
Moussa M, et al. 2025

Secondary CNV

Single IV aflibercept



**BCVA 20/25
FUP 6 months**



Moussa M, et al. 2025

DISCUSSION

- The pathological profile depends on the laser tissue interaction
- Short WL are more noxious (higher energy, less penetration, absorbed preferentially by melanin)

Photothermal damage

SM
hem-
or-
rhage

Sub-
macu-
lar
scar

CNV



RPE
chang
es

Outer
reti-
nal
de-
fect

Photochemical damage

- Non-thermal biochemical reaction releasing toxic free radicals
- Apoptosis of the RPE & photoreceptors

DISCUSSION

- Less VEGF load due to localized damage of the Bruch's membrane and cessation of the inciting pathology
- CNV secondary to laser pointer injury showed a swift favorable response to a reactive anti-VEGF protocol (1+PRN)

CONCLUSION

- Laser pointer maculopathy is a needless existence
- Educating ophthalmologists
- Liaison between ophthalmic institutions, the media, & legislative authorities

CONCLUSION

- SS-OCT is effective in depicting a characteristic morphological profile for LPM
- SS-OCTA is decisive in the diagnosis of 2ry CNV and monitoring its evolution in response the therapy

THANK YOU