

Circumscribed choroidal hemangioma: Visual outcome in the pre-PDT vs PDT eras in 458 cases

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- I have no financial interests or relationships to disclose.

Circumscribed Choroidal Hemangioma: Visual Outcome in the Pre-Photodynamic Therapy Era versus Photodynamic Therapy Era in 458 Cases

Q3Q2

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In summary,
Over 5 decades in 458 cases of
circumscribed choroidal
hemangioma, we have made headway
with PDT providing significantly
better visual outcome

Circumscribed choroidal hemangioma

- Benign vascular tumor
- Post-equatorial region
- Ultrasound dense
- Median basal diameter - 6 mm
- Median thickness - 3 mm
- Lead to profound visual loss
 - Subretinal fluid
 - Cystoid macular edema

What did we know 20 years back?

Circumscribed Choroidal Hemangioma

Clinical Manifestations and Factors Predictive of Visual Outcome in 200 Consecutive Cases

Carol L. Shields, MD, Santosh G. Honavar, MD, Jerry A. Shields, MD, Jacqueline Cater, PhD, Hakan Demirci, MD

Purpose: To review the clinical features and management of circumscribed choroidal hemangioma and determine factors predictive of poor visual outcome.

Design: Retrospective consecutive noncomparative interventional case series.

Participants: Two hundred consecutive patients with circumscribed choroidal hemangioma.

Main Outcome Measures: The main outcome measures were analyzed in 155 patients with follow-up of at least 3 months and included complete resolution of subretinal fluid, worsening of visual acuity (more than 2 Snellen lines), and poor final visual acuity (20/200 or worse).

n=200 cases

laser era

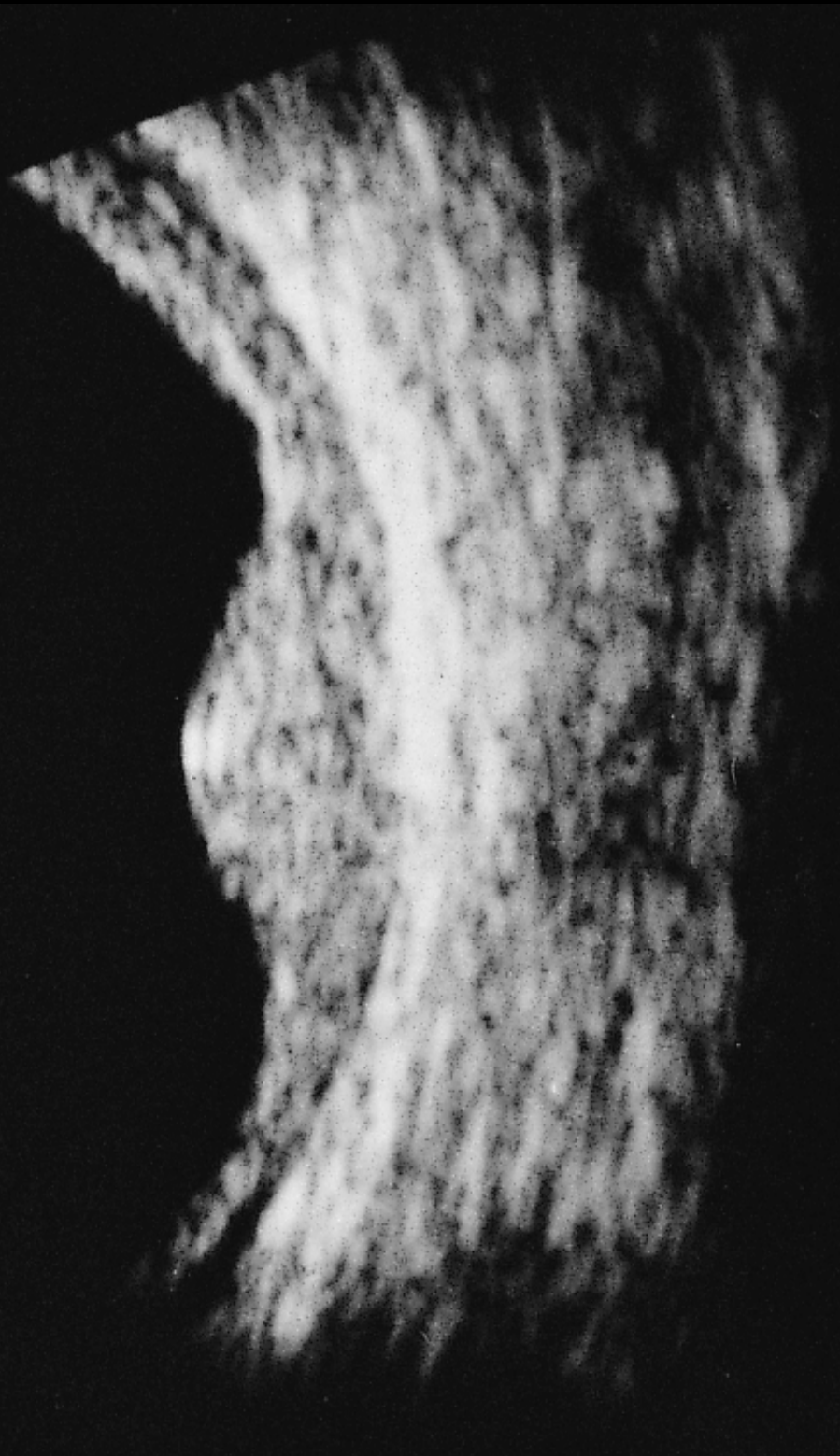
misdiagnosis in 38%

poor vision ($\leq 20/200$) in 60% @ 10 yrs,
despite control of SRF

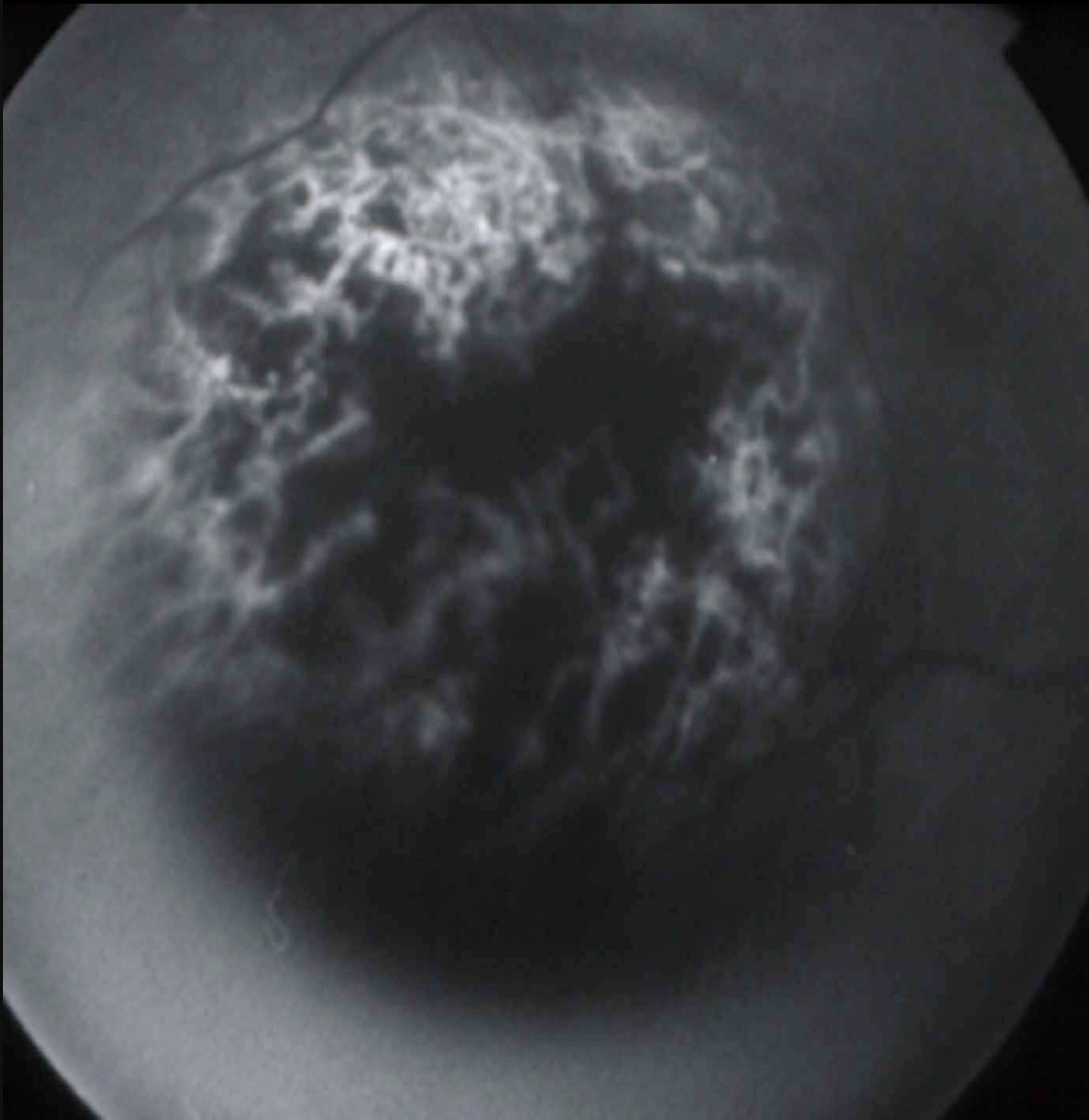
before referral ($P = 0.01$), and tumor management with observation after referral ($P = 0.02$). Worsening of visual acuity (by more than 2 Snellen lines) was observed in 8% at 5 years and 28% at 10 years of those 82 patients who were initially seen with poor vision. Worsening of visual acuity was found in 10% at 5 years and 30% at 10 years of those 73 patients who initially were seen with good to moderate vision.

Conclusions: Circumscribed choroidal hemangioma is a rare intraocular tumor. In 38% of cases, this tumor is initially misinterpreted before referral as choroidal melanoma or metastasis. Visual acuity is poor in more than 60% of patients at 10 years, despite successful control of associated subretinal fluid in 76% patients. *Ophthalmology* 2001;108:2237-2248 © 2001 by the American Academy of Ophthalmology.

Circumscribed choroidal hemangioma



Ultrasound echodense



IVFA early hyperFA

Circumscribed Choroidal Hemangioma: Characteristic Features with Indocyanine Green Videoangiography

J. Fernando Arevalo, MD,^{1,2} Carol L. Shields, MD,¹ Jerry A. Shields, MD,¹ Patrick De Potter, MD¹

Objective: To determine the characteristic features of indocyanine green videoangiography (ICG-V) of circumscribed choroidal hemangioma.

Design: Prospective, comparative.

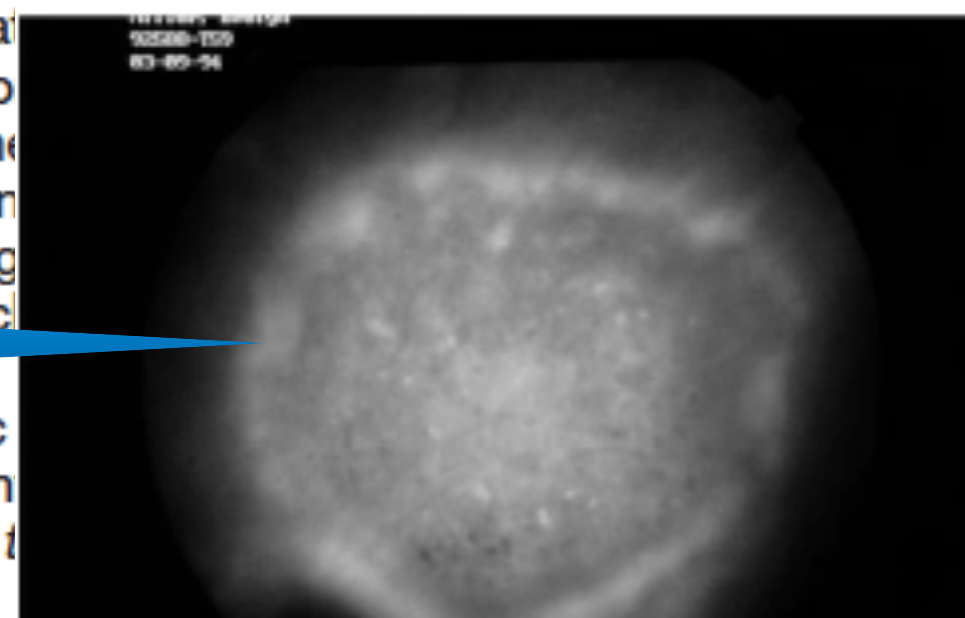
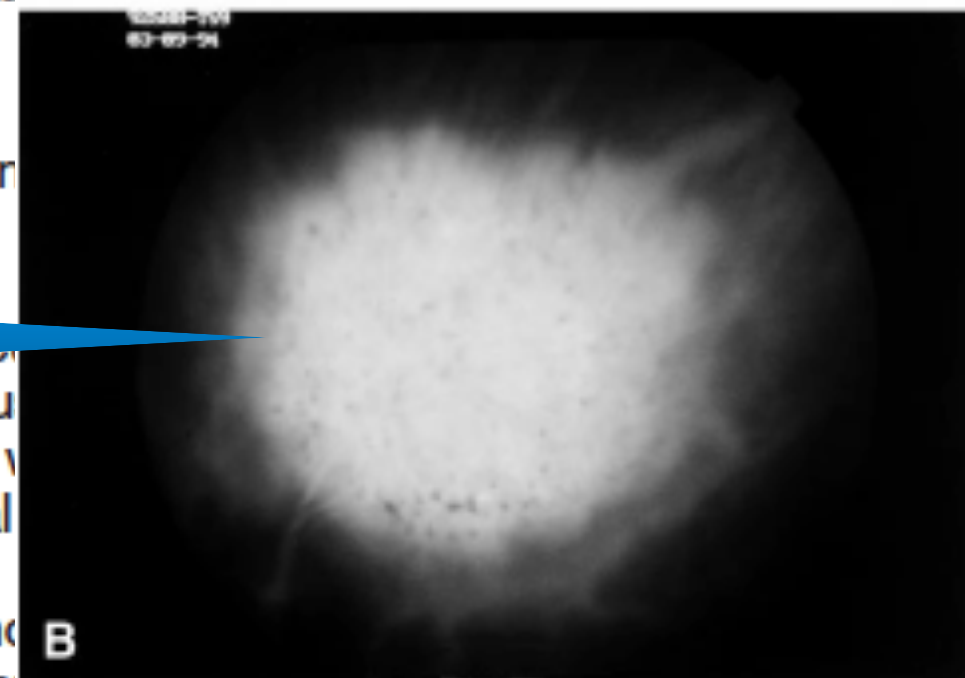
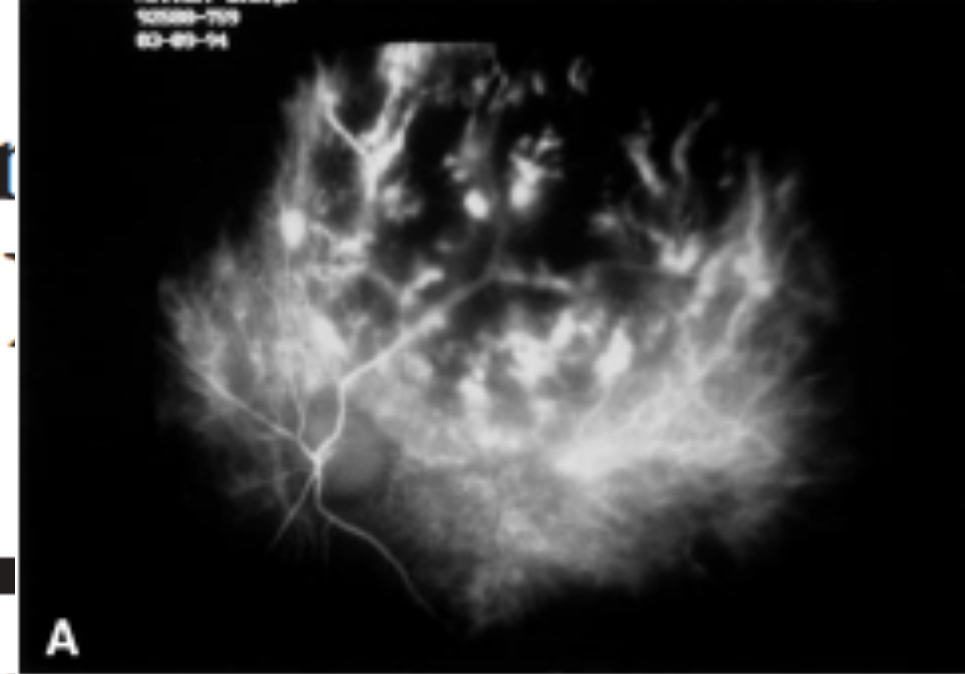
Participants: Twenty eyes with circumscribed choroidal hemangioma.

Intervention: Indocyanine green videoangiography (ICG-V) and intravenous fluorescein angiography (IVFA) were prospectively performed and compared to determine the specific features of ICG-V in circumscribed choroidal hemangioma.

Main Outcome Measures: The behavior of circumscribed choroidal hemangioma on ICG-V and IVFA.

Results: On ICG-V, earliest hyperfluorescence of circumscribed choroidal hemangioma was achieved at a mean of 27.6 seconds (range, 13–62 seconds), whereas maximum hyperfluorescence was achieved at a mean of 107.6 seconds (range, 33–707 seconds). In the late frames, all eyes demonstrated a relative washout of the dye. Other findings of circumscribed choroidal hemangioma on ICG-V included a late hyperfluorescent rim in 18 eyes (72%), and late frame hyperfluorescence in 19 eyes (76%). On IVFA, the earliest hyperfluorescence was achieved at a mean of 24 seconds (range, 13–62 seconds), whereas maximum hyperfluorescence was achieved at a mean of 107.6 seconds (range, 33–707 seconds). In the late frames, all eyes demonstrated a relative washout of the dye. Other findings of circumscribed choroidal hemangioma on IVFA included a late hyperfluorescent rim in 18 eyes (72%), and late frame hyperfluorescence in 19 eyes (76%).

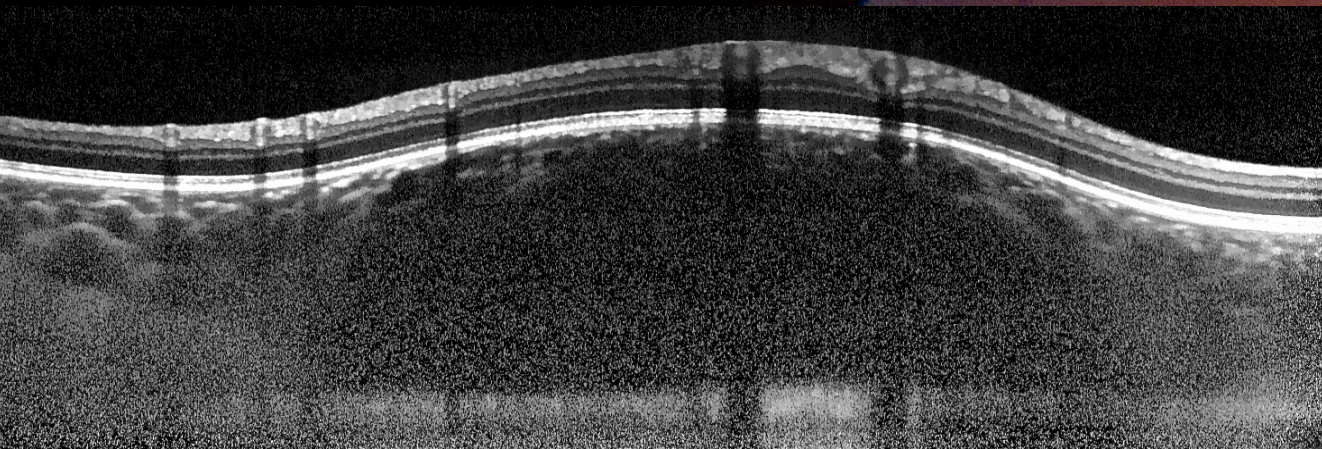
Conclusions: Circumscribed choroidal hemangioma has specific features on ICG-V and IVFA. We believe that ICG-V may become an important tool in the diagnosis of circumscribed choroidal hemangioma. *Ophthalmology* 2000;107:344–350 © 2000 by the American Academy of Ophthalmology.



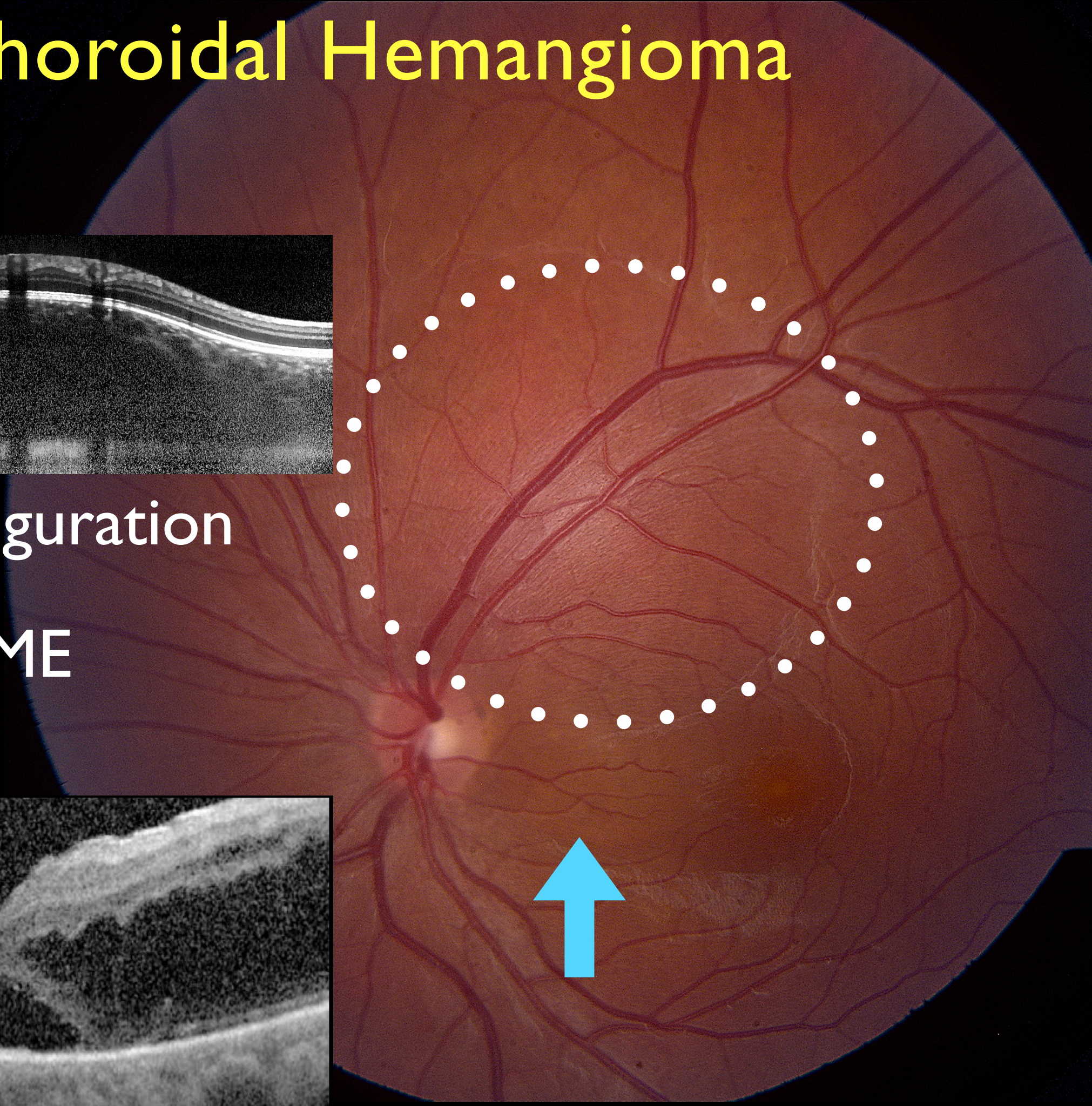
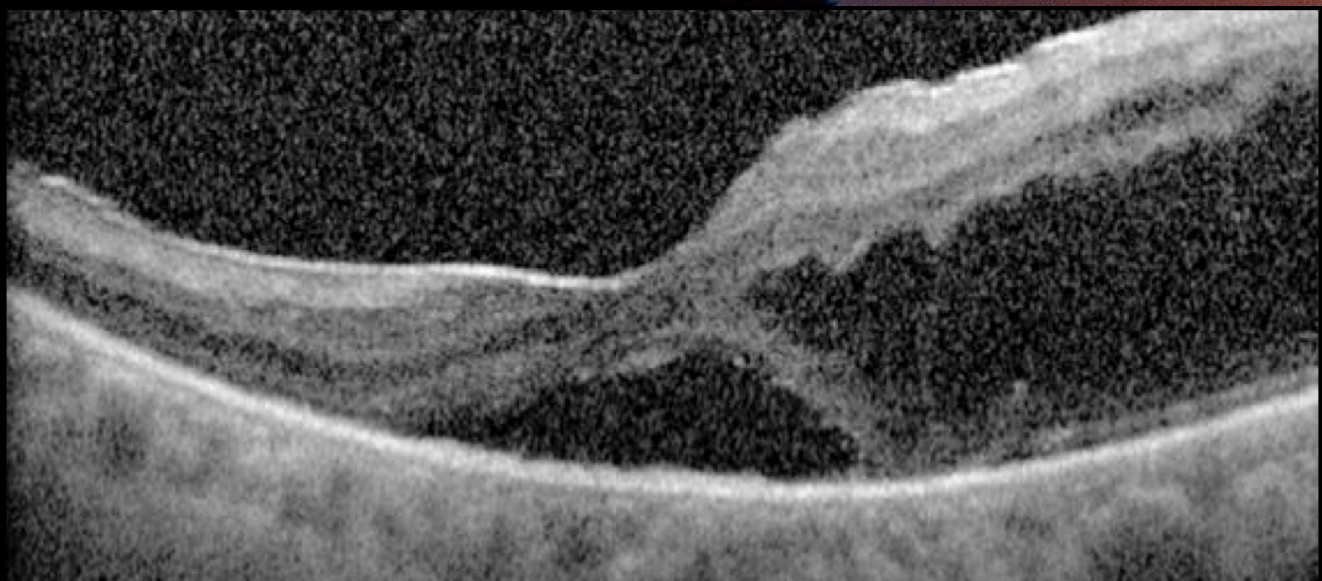
hyperICG @ 1
minute

washout @ 10
minutes

Choroidal Hemangioma



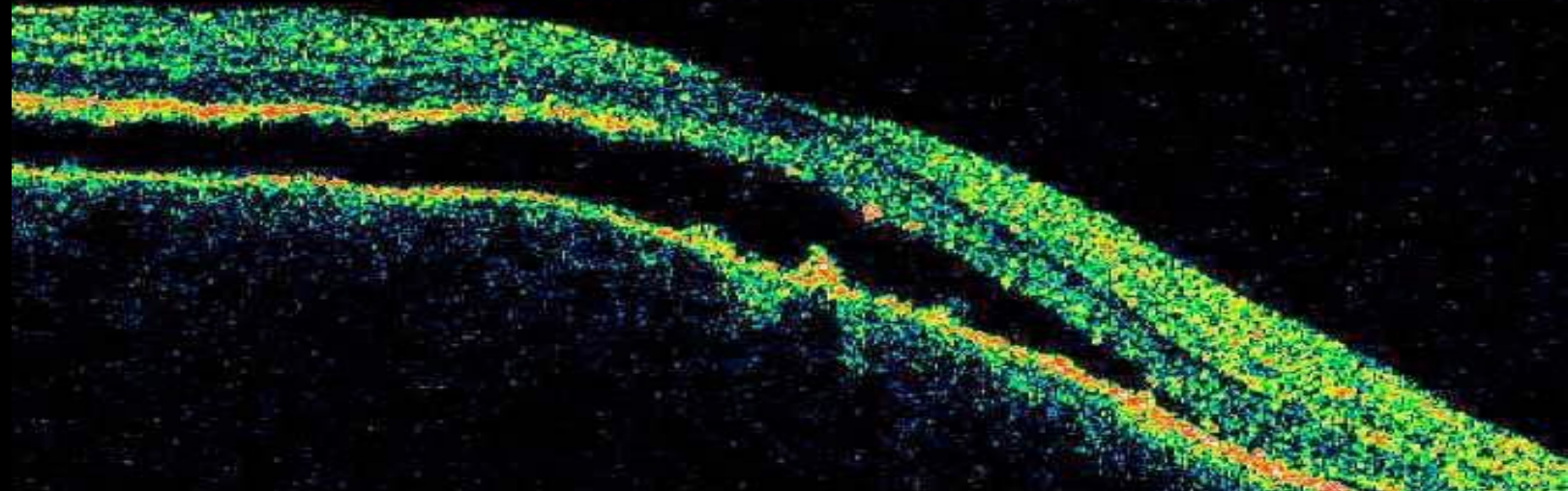
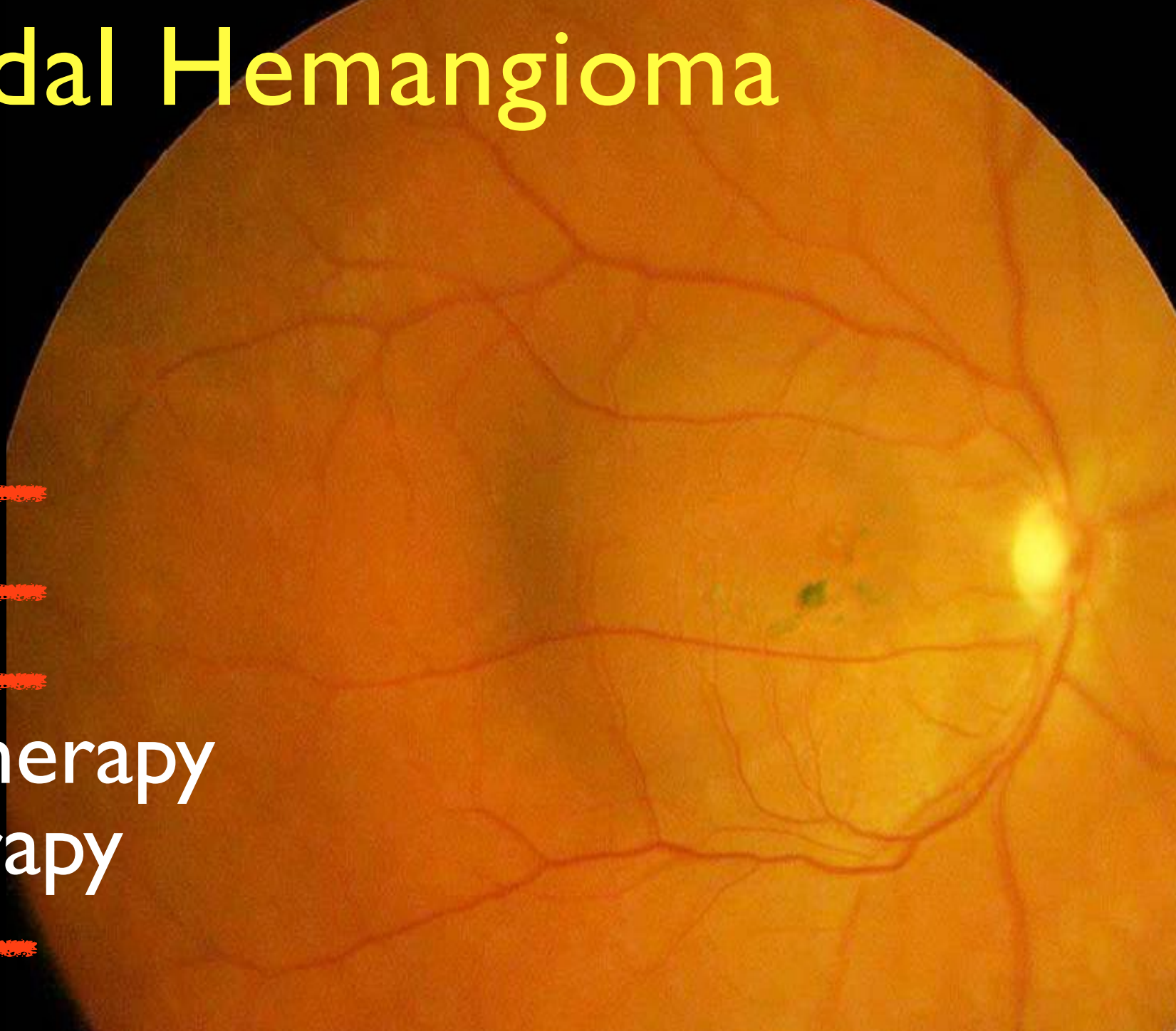
Smooth configuration
on OCT
Often SRF, CME



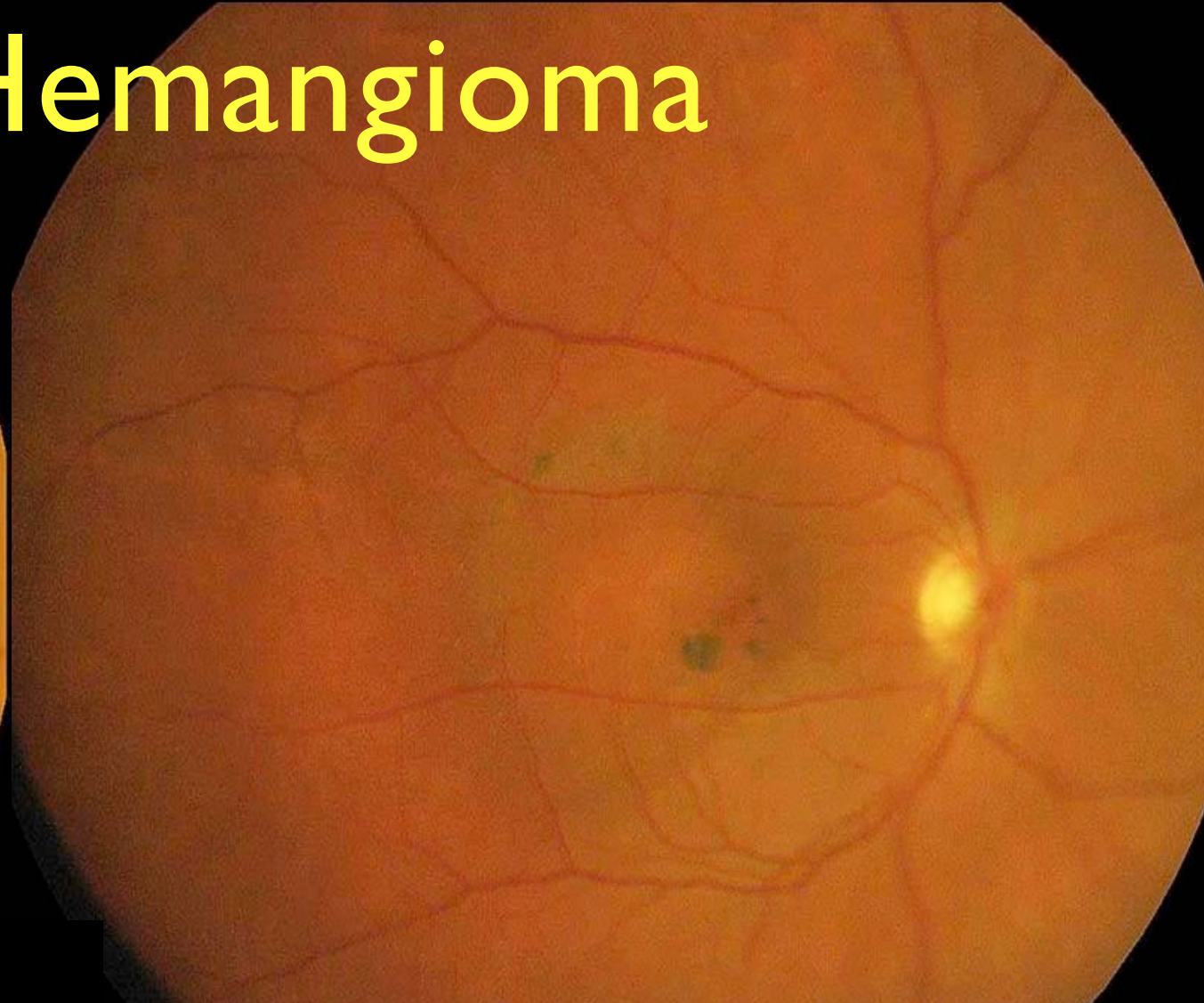
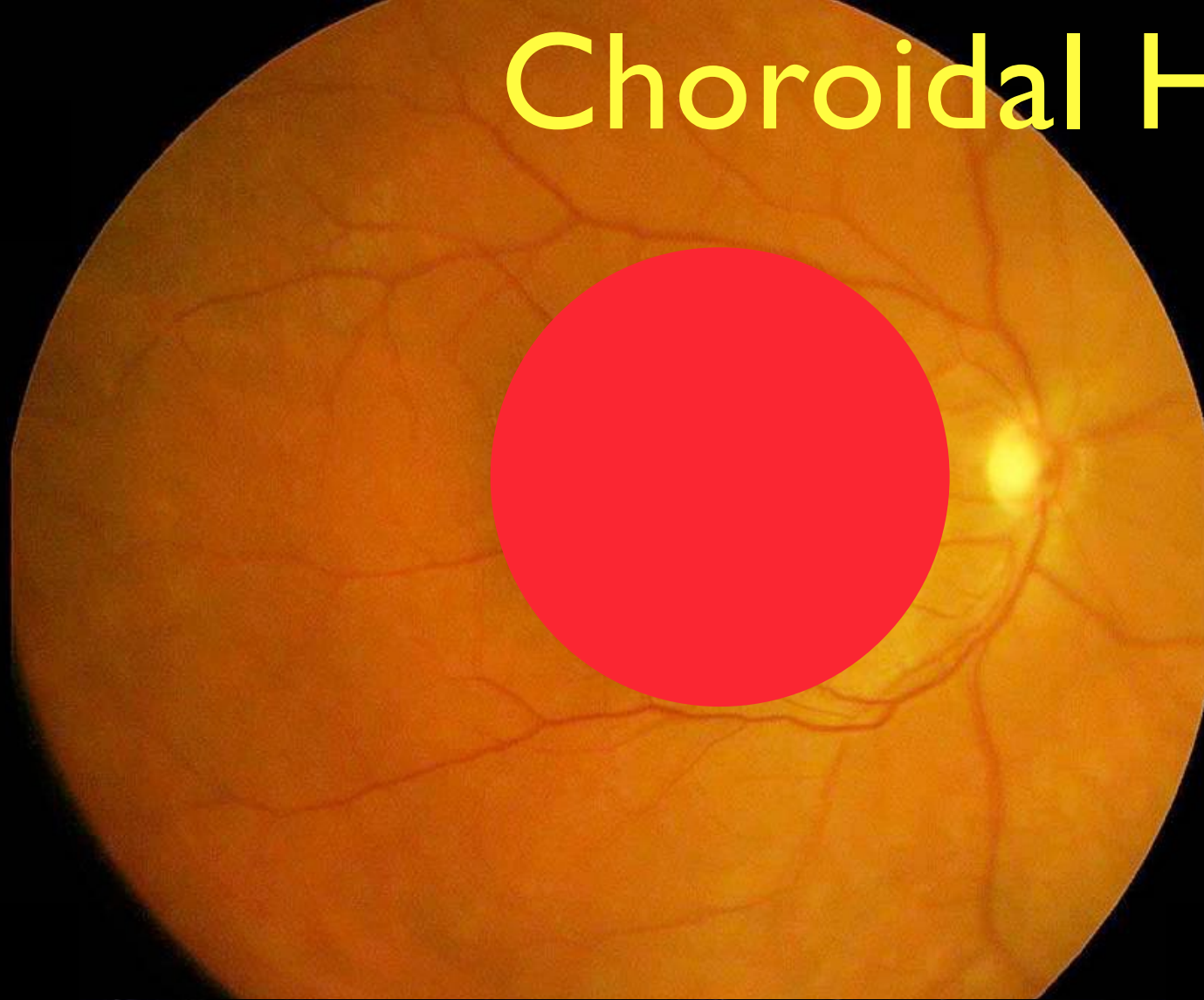
Choroidal Hemangioma

Treatment

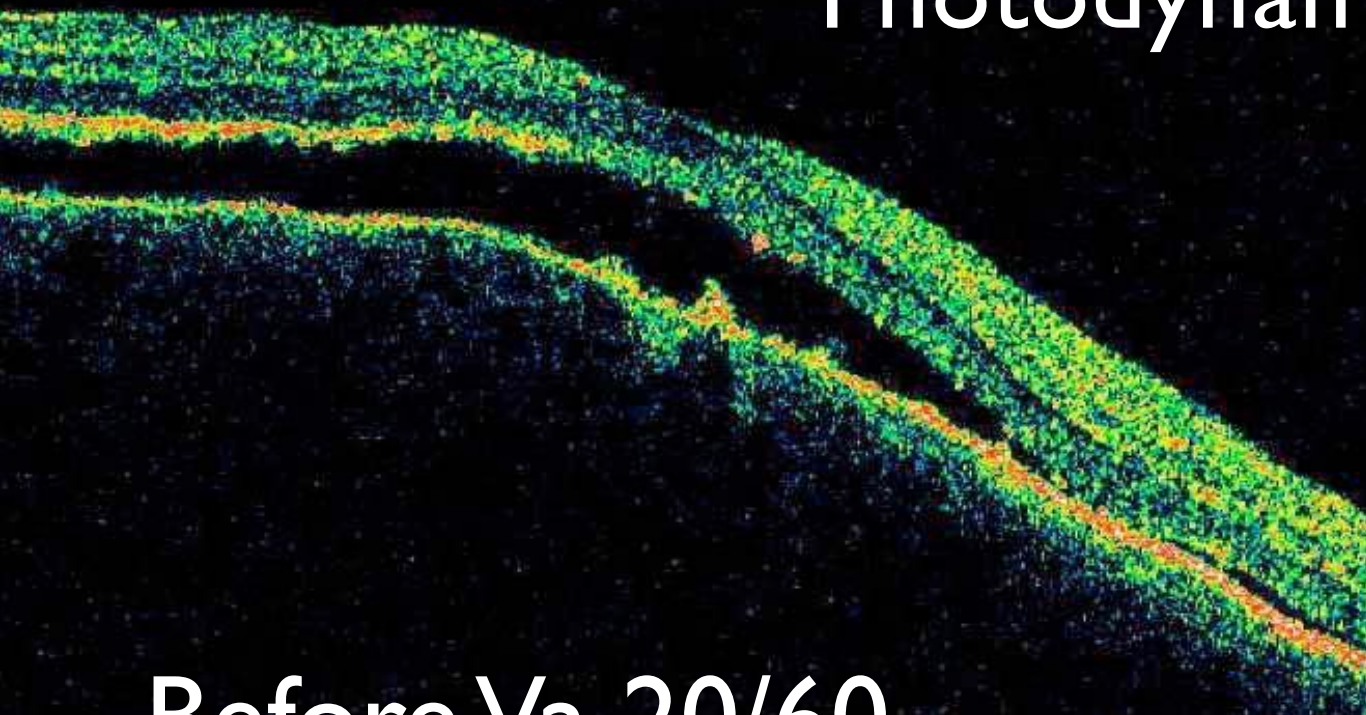
- Observation
- ~~Laser~~
- ~~Transpupillary thermotherapy~~
- Photodynamic therapy
- Plaque radiotherapy
- ~~Propranolol~~



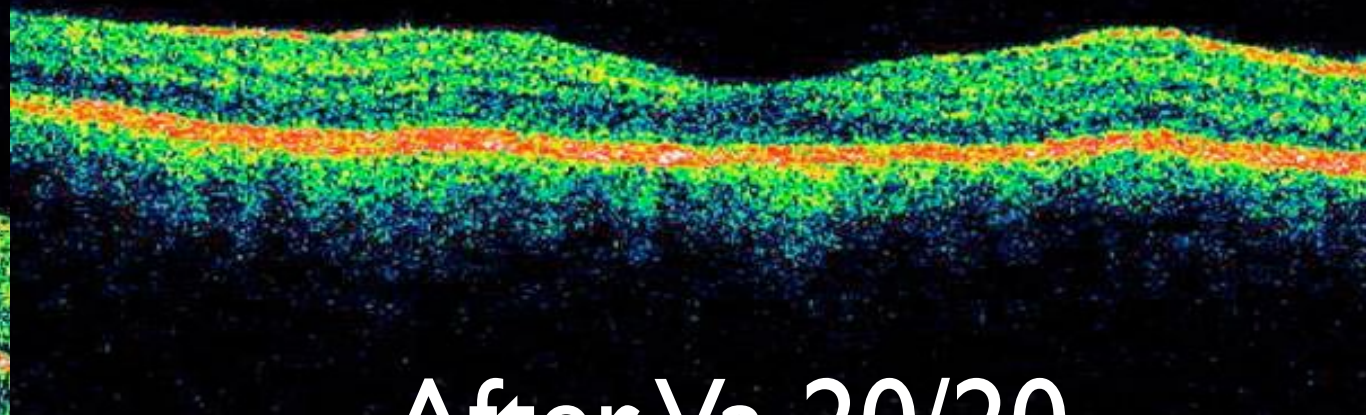
Choroidal Hemangioma



Photodynamic therapy



Before Va 20/60



After Va 20/20

Photodynamic Therapy for Symptomatic Choroidal Hemangioma

2002

Visual and Anatomic Results

Ursula M. Schmidt-Erfurth, MD,¹ Stephan M. Schmidt, MD,² Albert J. Augustin, MD³

Objective: To document the anatomic and functional regression of symptomatic choroidal hemangioma

Design: Prospective, noncomparative, interventional

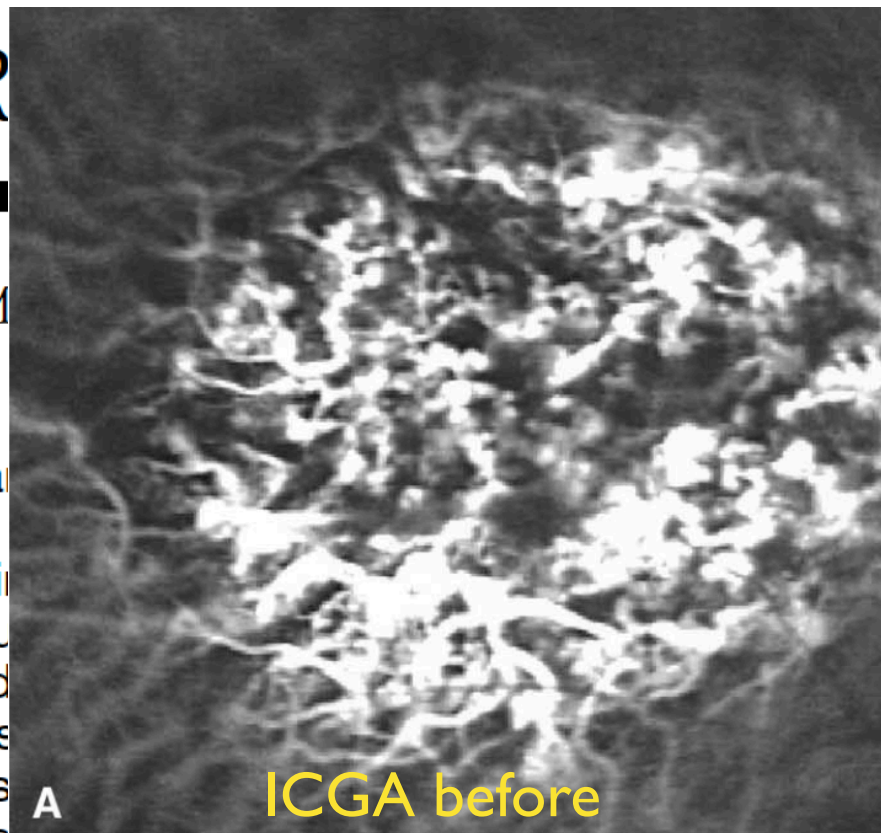
Participants: Fifteen patients with circumscribed choroidal hemangioma with progressive vision loss caused by exudative retinal detachment

Intervention: PDT using 6 mg/m² body surface of verteporfin was performed. One to four treatments with a 6-week interval were provided before and at 6-week follow-up 19 months after the last application

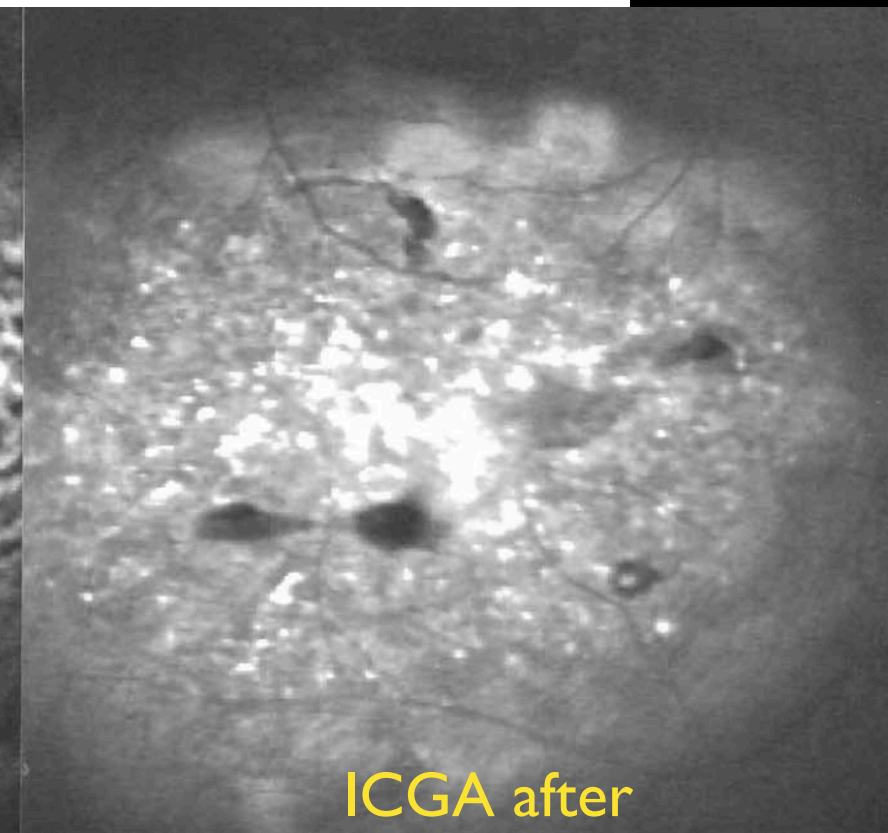
Main Outcome Measures: Functional (according to the Macular Swelling Study criteria) and scanning laser ophthalmoscopy, fluorescein/indocyanine green angiography

Results: A complete regression of the vascular leakage was achieved after four consecutive treatments. Tumors (mean diameter 1.5 mm) regressed after each treatment, with the most intensive effect after the fourth treatment. Complete resolution of metamorphopsia; 13 patients documented an average of 3 lines of improvement in visual acuity after therapy. Visual fields showed withdrawal of scotomata. Follow-up for up to 50 months.

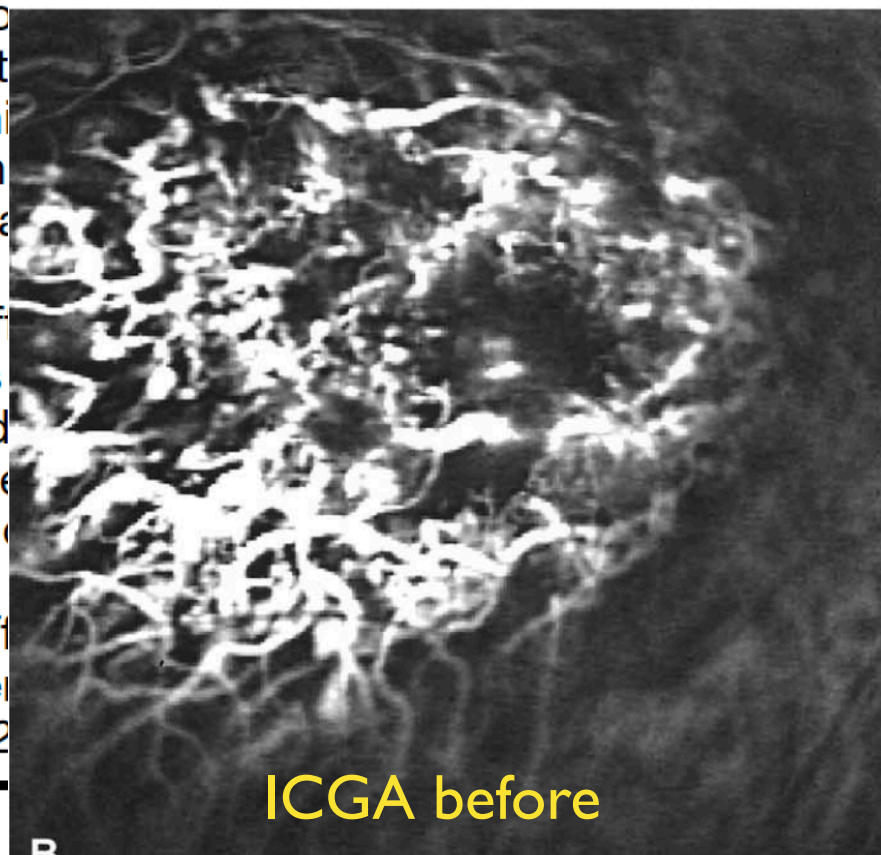
Conclusions: PDT using verteporfin of choroidal hemangioma. Complete anatomic regression with persistent improvement in vision. *Ophthalmology* 2002;109:2284-2291



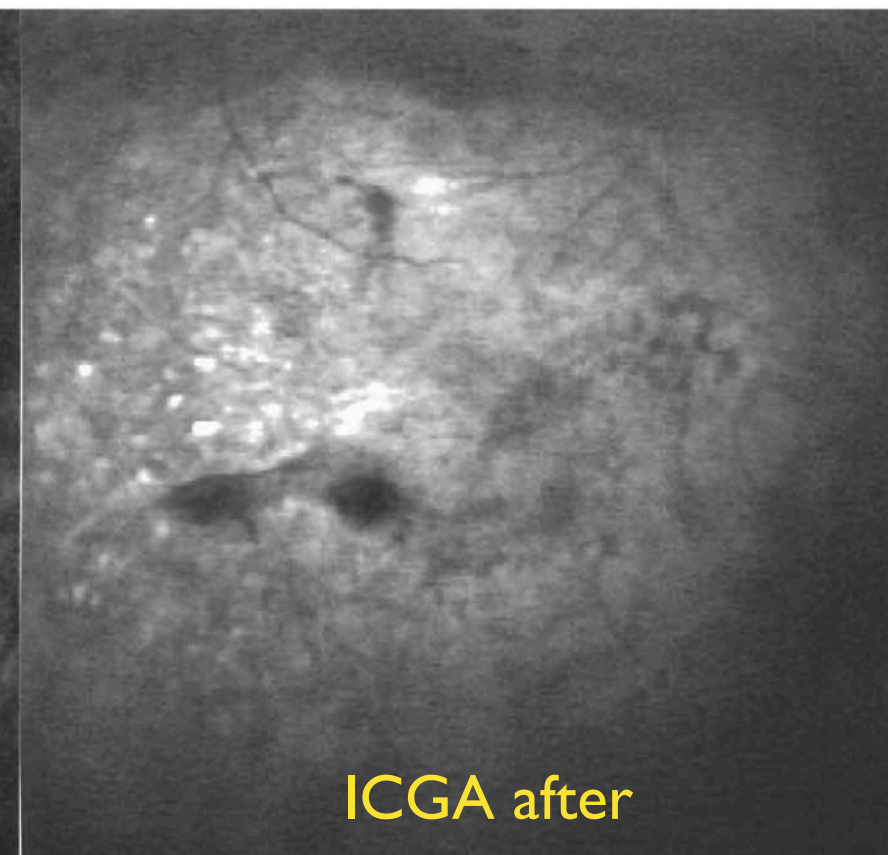
ICGA before



ICGA after



ICGA before



ICGA after

Photodynamic therapy using verteporfin in circumscribed choroidal haemangioma

2003

B Jurklies, G Anastassiou, S Ortmans, A Schüler, H Schilling, U Schmidt-Erfurth, N Bornfeld

Br J Ophthalmol 2003;**87**:84–89

Aim: To investigate the safety and efficacy of photodynamic therapy with verteporfin in patients with choroidal haemangioma.

Methods: A non-randomised, prospective clinical investigation of 19 patients with symptomatic circumscribed choroidal haemangioma was performed. Unsuccessful pretreatment (external beam irradiation, laser photocoagulation) was performed in four patients. Patients were included when (1) subretinal exudation involving the fovea, (2) a decrease in visual function, and (3) additional symptoms (for example, metamorphopsia) were present. Photodynamic therapy (PDT) was performed with verteporfin at a concentration of 6 mg/m² body surface and a light dose of 100 J/cm² at 689 nm.

Results: The mean follow up time was 2.15 (range 1–5). Visual acuity improved in 42.1%, was stable in 21.1%, and completely resolved in 94.8% of the tumours. Patients receiving any pretreatment were followed up for more than 30 months, and no significant improvement. Cox regression analysis showed that visual acuity was inversely associated with the improvement. No local or systemic side effects were observed.

Conclusion: PDT using verteporfin is effective in the treatment of circumscribed choroidal haemangioma even in tumours with subretinal exudation.

See end of article for authors' affiliations

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Accepted for publication
5 August 2002

n=19 cases

tumor reduction in 100%

visual acuity

- improved ≥ 1 line 73%

- improved ≥ 2 lines 42%

PDT sessions inverse to VA

no recurrence

Photodynamic therapy of circumscribed choroidal haemangioma

A D Singh

RESEARCH ARTICLE

Clinical outcomes and predictors of response to photodynamic therapy in symptomatic circumscribed choroidal hemangioma

Analysis of Long-term Outcomes of Radiotherapy and Verteporfin Photodynamic Therapy for Circumscribed Choroidal Hemangioma

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Laura L
Lu Che

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2 College
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Vasilios P. Papas
Marie Restori, P
Victoria M.L. C

Purpose: To evaluate the long-term efficacy of verteporfin photodynamic therapy (PDT) as the primary treatment for symptomatic circumscribed choroidal hemangioma (CCH).

Design: Retrospective case series.

Subjects: Twenty-five subjects with symptomatic CCH.

Methods: CCHs were treated with radiotherapy (LS) or PDT.

Main Outcome Measures: Primary outcome measures were changes in BCVA and foveal center thickness (FCT) between baseline and follow-up on FA, and adverse events.

Results: Twenty-two patients were treated with LS and 3 with PDT.

Conclusions: Long-term outcomes of PDT for CCH are promising, with a high rate of response and low risk of adverse events.

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CCHs
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Photodynamic Therapy with Verteporfin for Symptomatic Circumscribed Choroidal Hemangioma: Five-Year Outcomes

Maria Antonietta Blasi, MD,^{1,2} Alessandra C. Tiberti, MD, PhD,¹ Andrea Scupola, MD,¹ Angelo Balestrazzi, MD,³ Egle Colangelo, MD,¹ Paola Valente, MD,¹ Emilio Balestrazzi, MD¹

Objective: To evaluate the long-term efficacy of verteporfin photodynamic therapy (PDT) as the primary treatment for symptomatic circumscribed choroidal hemangioma (CCH).

Design: Prospective consecutive, 2-centered, noncomparative, interventional case series.

Participants: Twenty-five subjects with symptomatic CCH. All patients had recent onset of visual symptoms and evidence of exudative macular changes on fluorescein angiography (FA) and optical coherence tomography (OCT).

Methods: Verteporfin 6 mg/m² body surface area was administered intravenously over a 10-minute interval. Five minutes after infusion, a 689 nm laser was applied with a light dose of 50 J/cm² for the first 3 patients and a light dose of 100 J/cm² for all the other patients. Retreatments were performed in case of persistent exudation found on OCT. Evaluation of best-corrected visual acuity (BCVA) using Early Treatment of Diabetic Retinopathy Study (ETDRS) criteria, FA, indocyanine green angiography (ICGA), OCT, and ultrasound were performed before PDT and on follow-up examinations. All patients were followed for at least 5 years.

Main Outcome Measures: Primary outcome measures were changes in BCVA and foveal center thickness (FCT) between baseline and follow-up on FA, and adverse events.

Results: Twenty-two patients were treated with PDT. Three eyes, treated with 50 J/cm², showed no response. After a follow-up of 60 months, 19 eyes (86%) showed a response, with a mean BCVA of 20/40 and a mean FCT of 250 µm.

all with ≤ 25 cases



Collected data on 458 eyes with
circumscribed choroidal hemangioma
over 5 decades

Evaluate

Outcomes based on age

Outcomes based on era

- pre-PDT era vs the PDT era

Circumscribed Choroidal Hemangioma: Visual Outcome in the Pre-Photodynamic Therapy Era versus Photodynamic Therapy Era in 458 Cases

Ophthalmology Retina 2020

Q3Q2

Q10 Carol L. Shields, MD,¹ Lauren A. Dalvin, MD,² Li-Anne S. Lim, MD,¹ Michael Chang, MD,¹
Sanika Udyaver, BS,¹ Mehdi Mazloumi, MD, MPH,¹ Pornpattana Vichitvejpaisal, MD,³ Grace L. Su, BS,¹
Q4Q1 Eleni Florakis, BS,¹ Arman Mashayekhi, MD,¹ Jerry A. Shields, MD¹

Pre-PDT	vs	PDT
1967-2001		2002-2018
n=220		n=238

vs. PDT [n = 238 cases]) revealed PDT era patients were of older mean age (48.9 vs. 53.8 years, $P = 0.002$) and were more likely to have systemic hypertension (17.7% vs. 33.8%, $P < 0.001$), tumor location in the macula (57.4% vs. 67.5%, $P = 0.01$), subretinal fluid on OCT (33.3% vs. 70.7%, $P = 0.01$), and greater extent of overlying lipofuscin ($P = 0.001$). Findings of tumor basal diameter and thickness and fluorescein and indocyanine green angiography were no different in the 2 eras. Treatment (pre-PDT vs. PDT) included argon laser photocoagulation (42.1% vs. 0.4%), PDT (0% vs. 43.8%), transpupillary thermotherapy (0% vs. 0.4%), plaque radiotherapy (7.0% vs. 5.2%), external beam radiotherapy (1.4% vs. 1.3%), enucleation (0.9% vs. 0.4%), and observation (48.6% vs. 47.6%). After treatment, patients in the PDT era demonstrated better mean logarithm of the minimum angle of resolution visual acuity (1.28 vs. 0.51, $P < 0.001$) (Snellen equivalent 20/400 vs. 20/63, $P < 0.001$). Final visual acuity was $\geq 20/40$ for those with entering vision of $\geq 20/40$ (59.6% vs. 74.7%, $P = 0.001$) and for those with entering vision of 20/50–20/200 (25.4% vs. 47.3%, $P < 0.001$).

Conclusions: Management of choroidal hemangioma in the PDT era has allowed for significantly better vi-

Circumscribed Choroidal Hemangioma: Visual Outcome in the Pre-Photodynamic Therapy Era versus Photodynamic Therapy Era in 458 Cases

Table 1. Visual Outcome of Circumscribed Choroidal Hemangioma in the Pre-Photodynamic Therapy Era (n = 220) versus Photodynamic Therapy Era (n = 238) in 458 Tumors of 457 Patients: Patient Demographics

Demographic Features	Pre-PDT Era (1967–2001) n = 220 Tumors in 220 Patients (%)	PDT Era (2002–2018) n = 238 Tumors in 237 Patients (%)	P Value	Total N = 458 Tumors in 457 Patients (%)
Age at presentation (yrs) (n = 457 patients)				
Mean (median, range)	48.9 (49.5, 3–93)	53.8 (56, 4–89)	0.002	51.4 (52, 3–93)
Sex (n = 457 patients)				
Male	126 (57.3)	143 (60.3)	0.51	269 (58.9)
Female	94 (42.7)	94 (39.7)		188 (41.1)
Race (n = 457 patients)				
White	190 (86.4)	203 (85.6)		393 (86.0)
African American	7 (3.2)	5 (2.1)		12 (2.6)
Asian	4 (1.8)	6 (2.5)	0.22	10 (2.2)
Hispanic	7 (3.2)	12 (5.1)		19 (4.2)
Middle Eastern	1 (0.5)	1 (0.4)		2 (0.4)
Indian	0 (0.0)	4 (1.7)		4 (0.8)
Unknown	10 (4.5)	5 (2.1)		15 (3.3)
Study eye (n = 458 tumors)				
Right eye	107 (48.6)	122 (51.3)		229 (50.0)
Left eye	113 (51.4)	115 (48.3)	0.51	228 (49.8)
Both eyes	0 (0.0)	0 (0.0)		0 (0.0)

Circumscribed Choroidal Hemangioma: Visual Outcome in the Pre-Photodynamic Therapy Era versus Photodynamic Therapy Era in 458 Cases

Table 2. Visual Outcome of Circumscribed Choroidal Hemangioma in the Pre-Photodynamic Therapy Era (n = 220) versus Photodynamic Therapy Era (n = 238) in 458 Tumors of 457 Patients: Clinical Features at Presentation

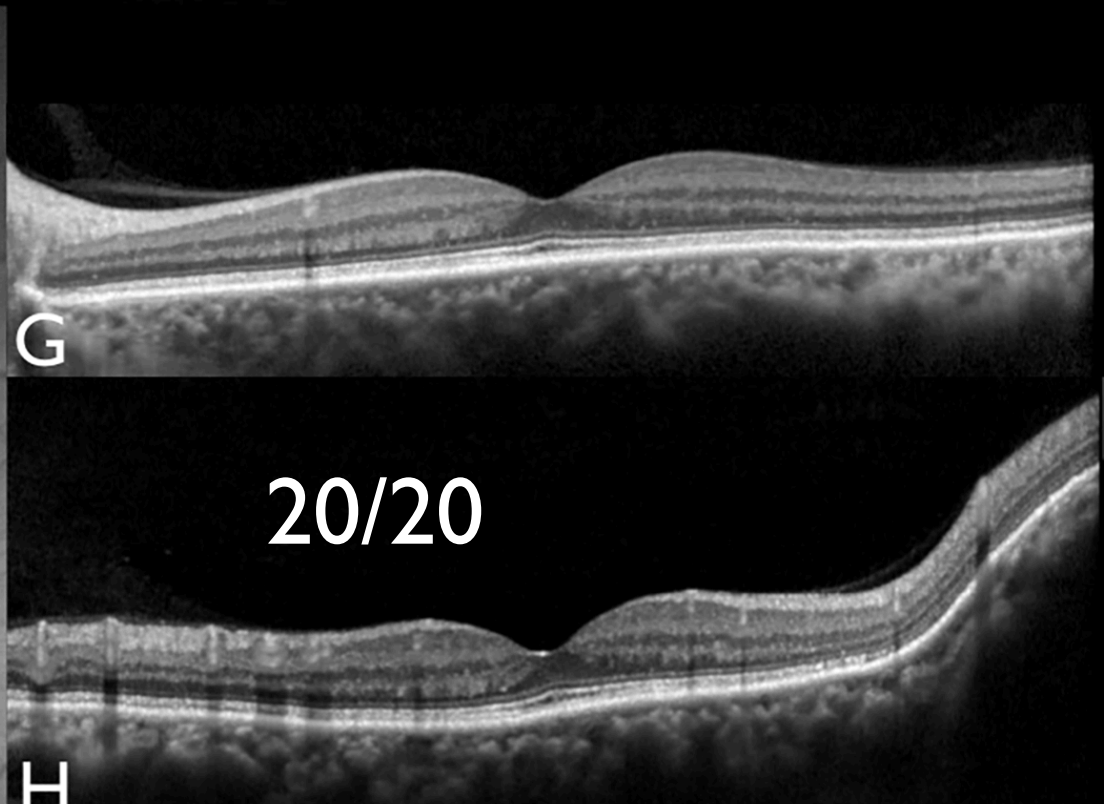
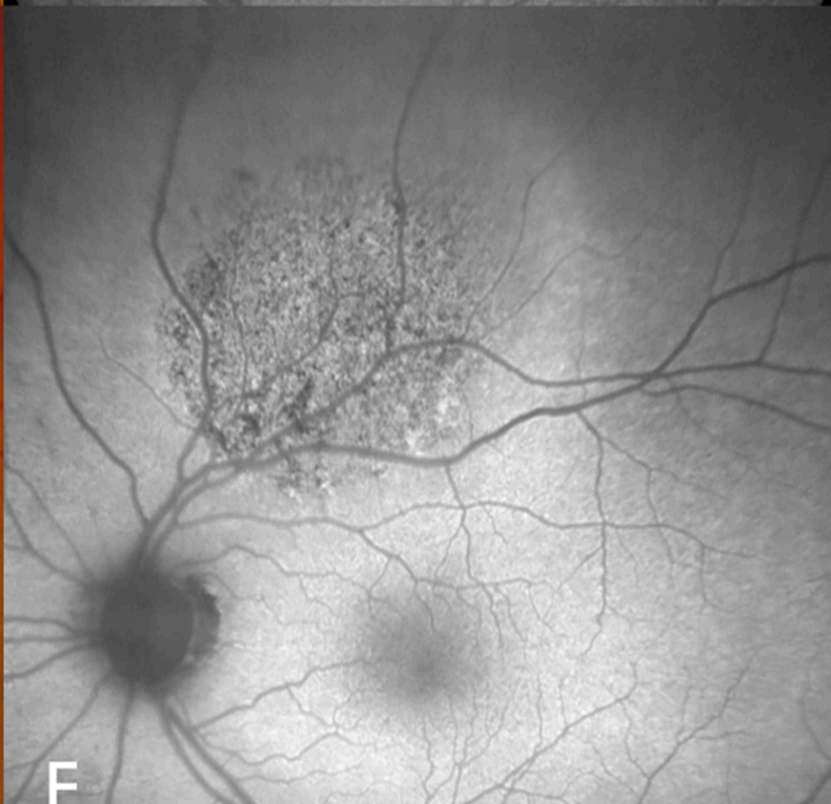
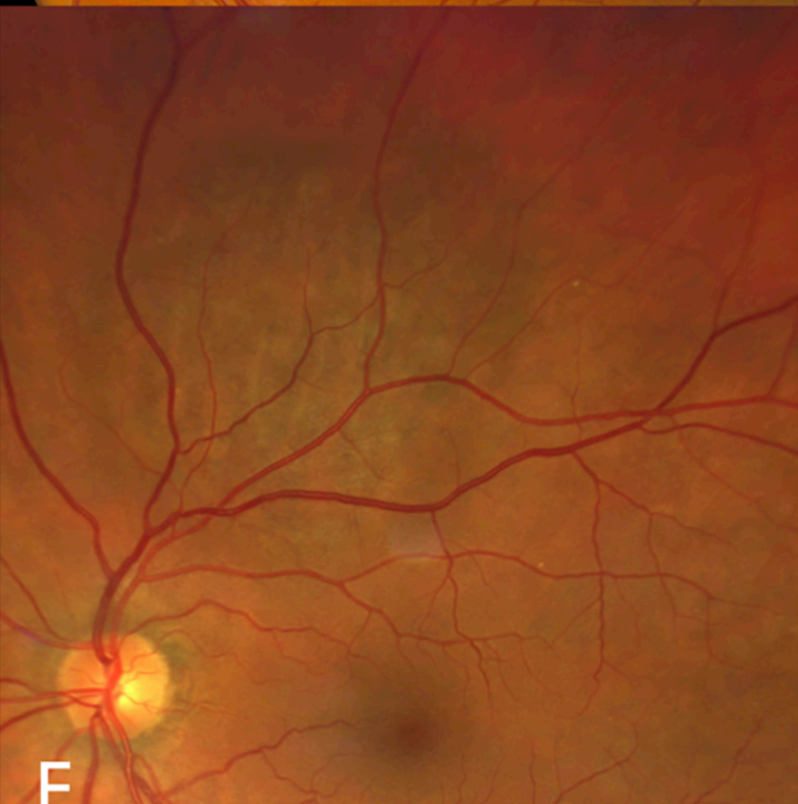
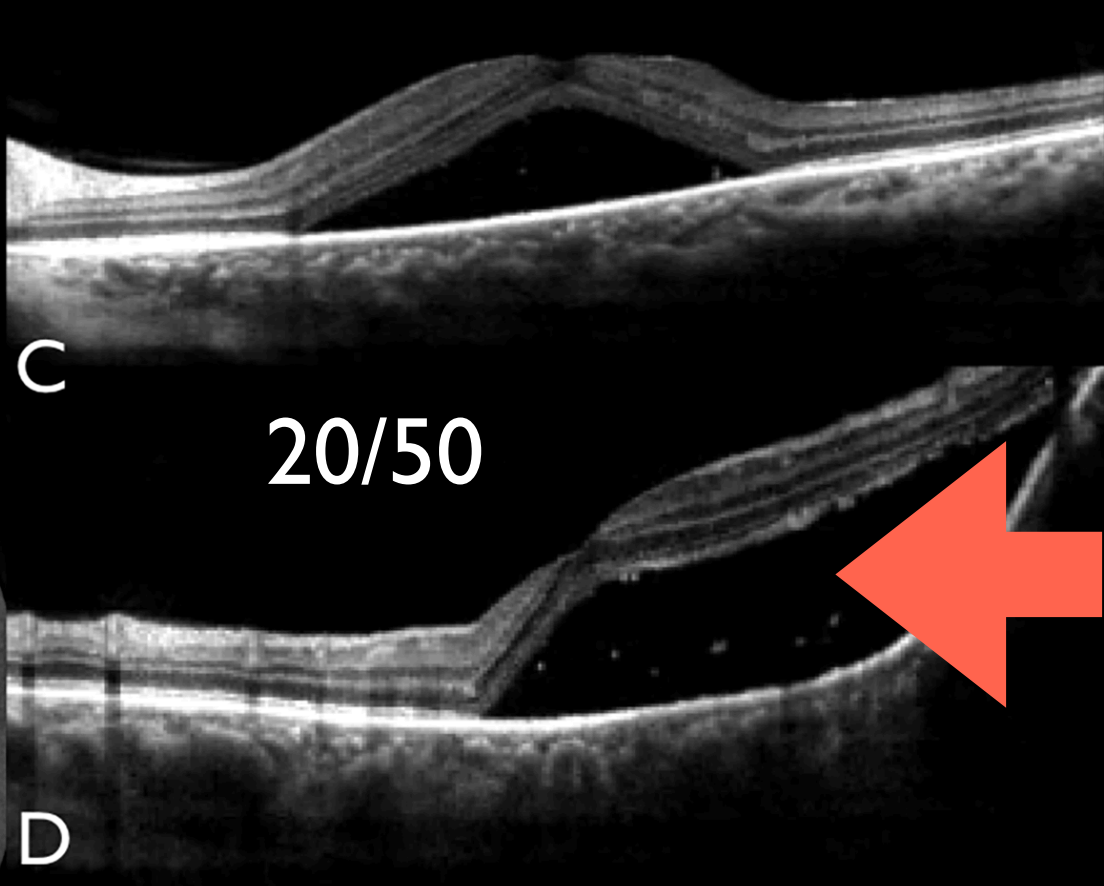
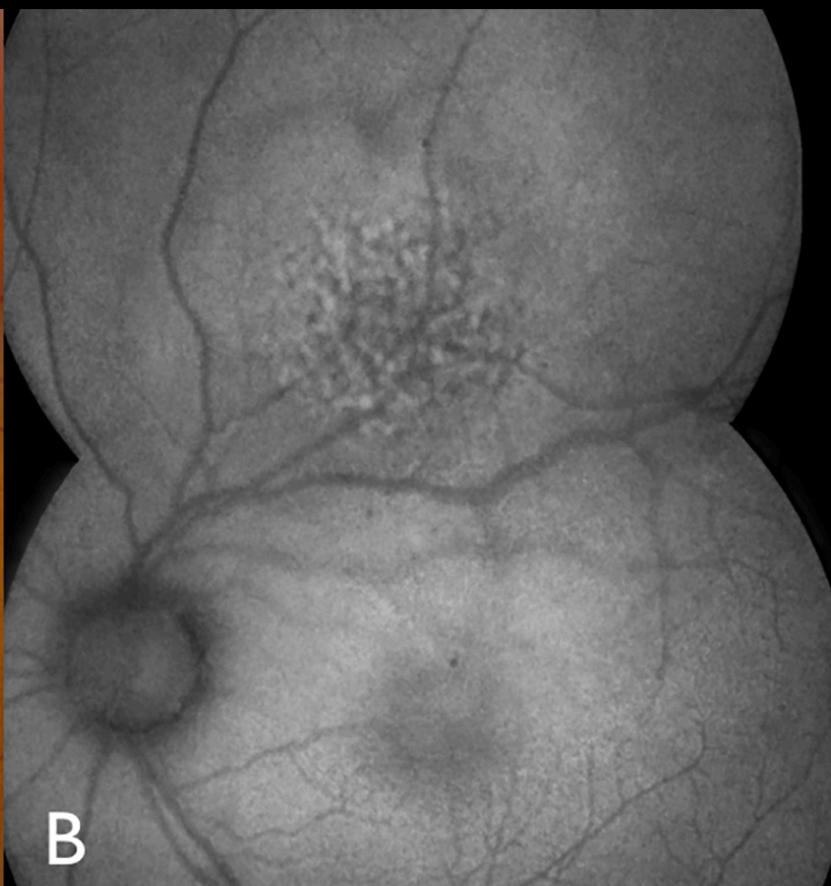
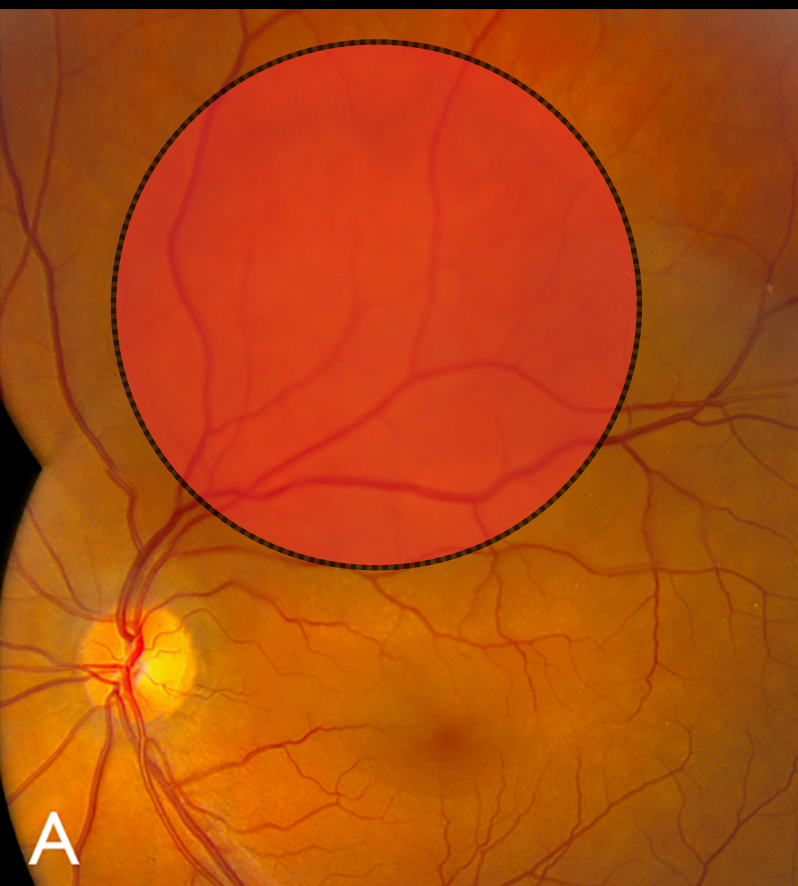
Clinical Tumor Features	Pre-PDT Era (1967–2001) n = 220 Tumors in 220 Patients (%)	PDT Era (2002–2018) n = 238 Tumors in 237 Patients (%)	P Value	Total N = 458 Tumors in 457 Patients (%)
No. of tumor(s)	n = 220	n = 238		N = 458
No. of tumors per patient, mean (median, range)	1.00 (1, 1–1)	1.00 (1, 1–2)	0.34	1.00 (1, 1–2)
No. of tumors per eye, mean (median, range)	1.00 (1, 1–1)	1.01 (1, 1–2)	0.17	1.01 (1, 1–2)
Size tumor	n = 220	n = 238		N = 458
Tumor diameter (mm), mean (median, range)	6.84 (6.5, 1–16)	6.77 (6, 2–24)	0.80	6.80 (6, 1–24)
Tumor thickness (mm), mean (median, range)	3.05 (3, 1–8)	3.24 (3, 1–11)	0.12	3.15 (3, 1–11)
Location proximity disc and foveola	n = 220	n = 238		N = 458
Distance to optic disc (mm), mean (median, range)	1.65 (0.5, 0–18)	1.75 (1.0, 0–8)	0.62	1.71 (1.0, 0–18)
Distance to foveola (mm), mean (median, range)	1.24 (0.5, 0–15)	1.22 (0.5, 0–7)	0.91	1.23 (0.5, 0–15)
Location quadrant	n = 216	n = 237		N = 453
Macula	124 (57.4)	160 (67.5)		284 (62.7)
Inferior	18 (8.3)	14 (5.9)		32 (7.1)
Temporal	33 (15.3)	14 (5.9)	0.01	47 (10.4)
Superior	22 (10.2)	27 (11.4)		49 (10.8)
Nasal	19 (8.8)	22 (9.3)		41 (9.1)
Subretinal fluid surrounding tumor	n = 215	n = 236		N = 451
None	52 (24.2)	74 (31.4)		126 (27.9)
Subretinal fluid cap	36 (16.7)	48 (20.3)		84 (18.6)
Subretinal fluid <3 mm from tumor	47 (21.9)	50 (21.2)	0.10	97 (21.5)
Subretinal fluid 3–6 mm from tumor	24 (11.2)	25 (10.6)		49 (10.8)
Subretinal fluid >6 mm from tumor	56 (26.0)	39 (16.5)		95 (21.1)
Subretinal fluid under macula	n = 213	n = 235		N = 448
Submacular fluid	56 (26.3)	52 (22.1)	0.06	108 (24.1)

Circumscribed Choroidal Hemangioma: Visual Outcome in the Pre-Photodynamic Therapy Era versus Photodynamic Therapy Era in 458 Cases

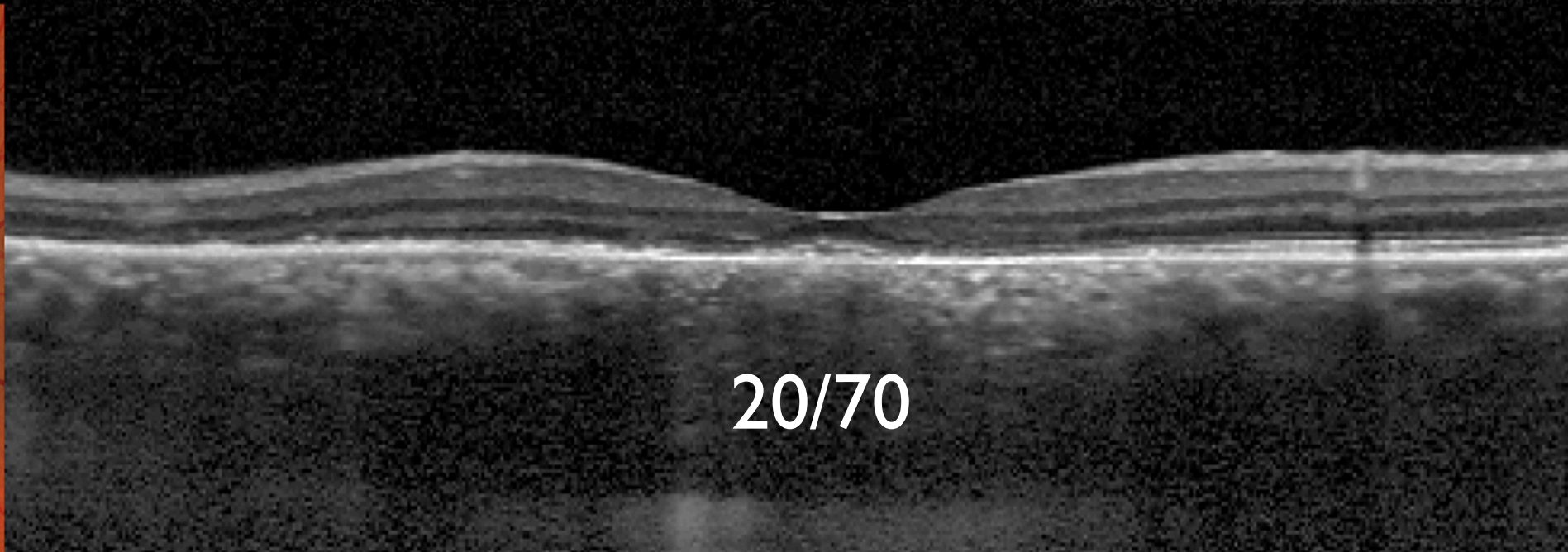
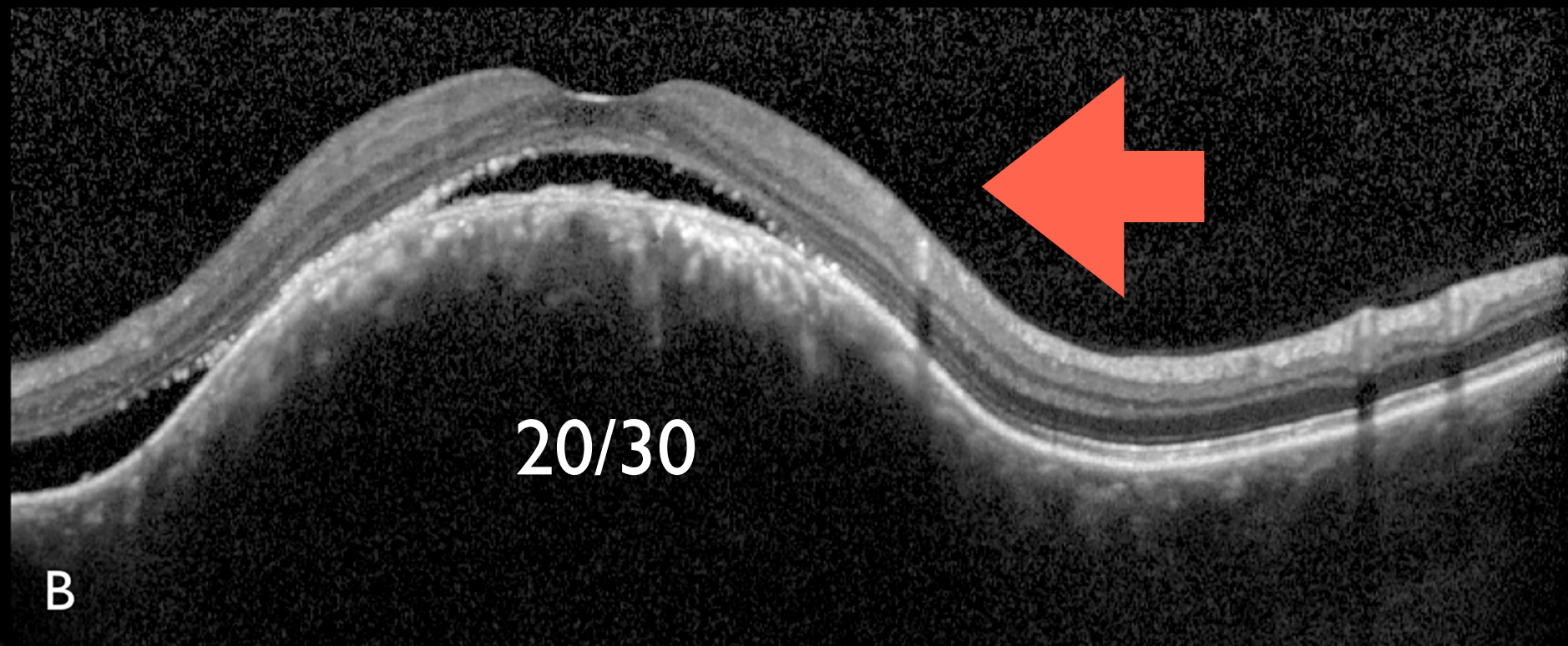
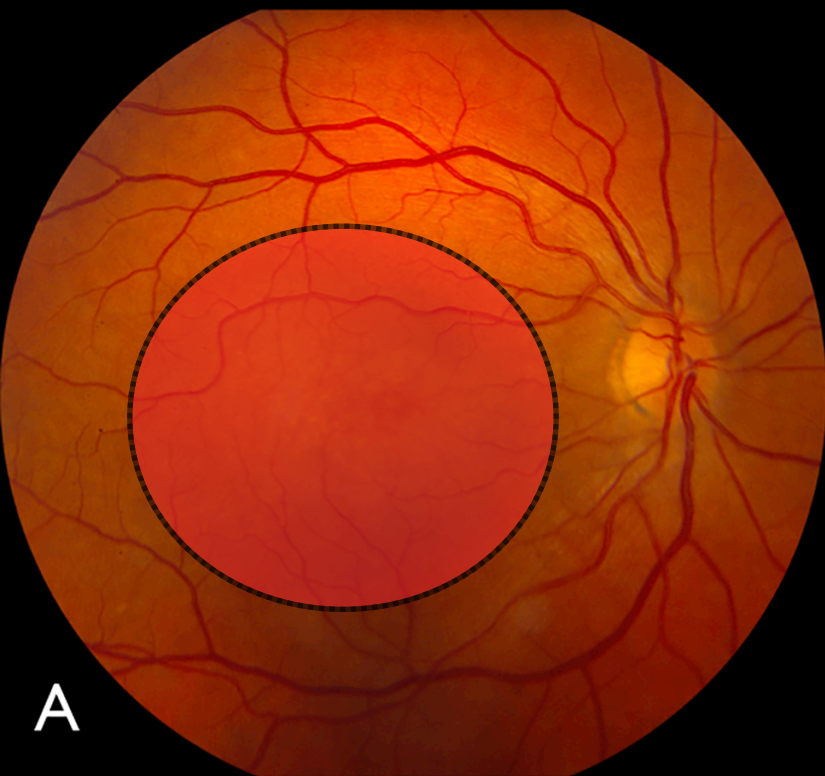
Table 4. Visual Outcome of Circumscribed Choroidal Hemangioma in the Pre-Photodynamic Therapy Era (n = 220) versus Photodynamic Therapy Era (n = 238) in 458 Tumors of 457 Patients: Treatment Features

Treatment Features	Pre-PDT Era (1967–2001) n = 220 Tumors in 220 Patients (%)	PDT era (2002–2018) n = 238 Tumors in 237 Patients (%)	P Value	Total N = 458 Tumors in 457 Patients (%)
Reason for treatment	n = 106	n = 119		N = 225
Subretinal fluid progression	36 (34.0)	27 (22.7)		63 (28.0)
Subretinal fluid at fovea	65 (61.3)	80 (67.2)		145 (64.4)
Retinal exudation	2 (1.9)	2 (18.2)		4 (1.8)
Hemorrhage	0 (0.0)	0 (0.0)	0.04	0 (0.0)
Macular edema	2 (1.9)	10 (8.4)		12 (0.9)
Choroidal neovascular membrane	0 (0.0)	0 (0.0)		0 (0.0)
Blind painful eye	1 (0.9)	0 (0.0)		1 (0.4)
Primary treatment modality	n = 214	n = 233		N = 447
Observation	104 (48.6)	111 (47.6)		215 (48.1)
Transscleral diathermy	0 (0.0)	0 (0.0)		0 (0.0)
Argon laser photocoagulation	90 (42.1)	1 (0.4)		91 (20.4)
Transpupillary thermotherapy	0 (0.0)	1 (0.4)		1 (0.2)
PDT	0 (0.0)	102 (43.8)		102 (22.8)
Plaque radiotherapy	15 (7.0)	12 (5.2)	<0.001	27 (6.0)
External beam radiotherapy	3 (1.4)	3 (1.3)		6 (1.3)
Enucleation	2 (0.9)	1 (0.4)		3 (0.7)
Subtenon triamcinolone	0 (0.0)	0 (0.0)		0 (0.0)
Intravitreal triamcinolone	0 (0.0)	0 (0.0)		0 (0.0)
Intravitreal anti-VEGF	0 (0.0)	2 (0.9)		2 (0.4)

Post-PDT - SRF

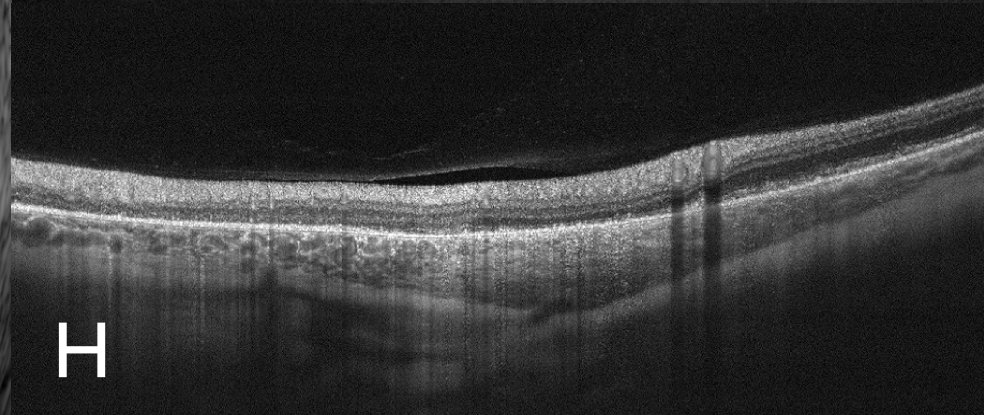
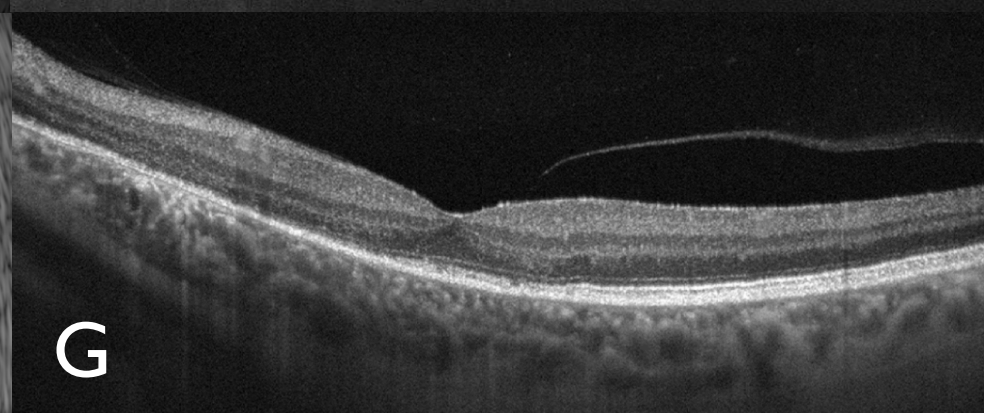
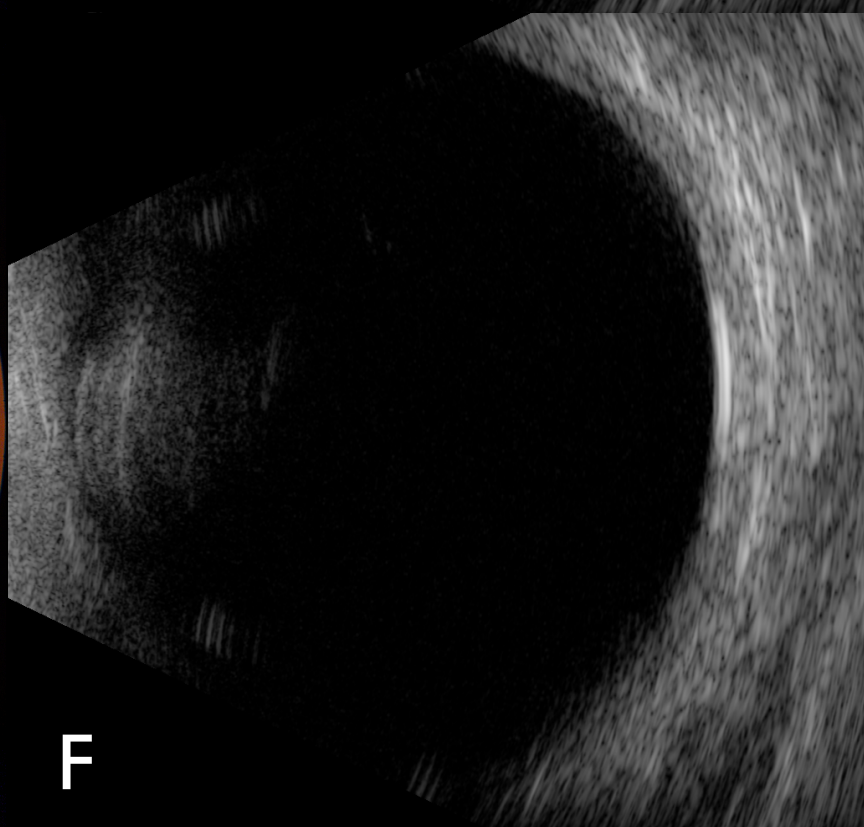
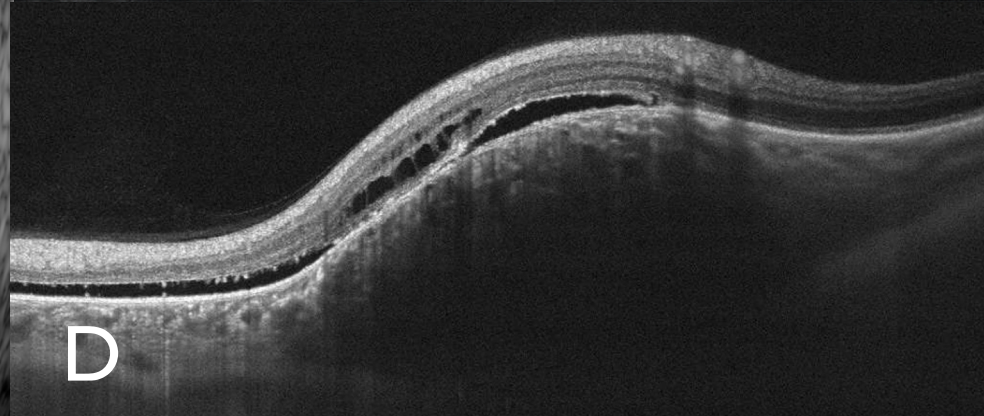
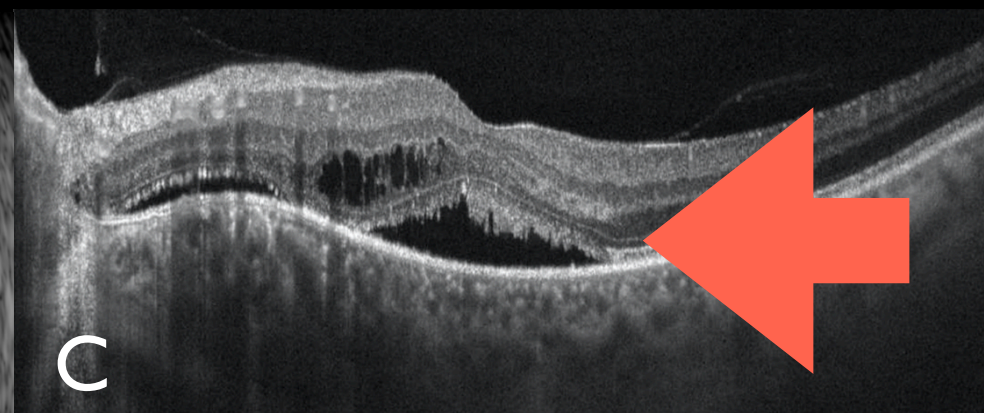
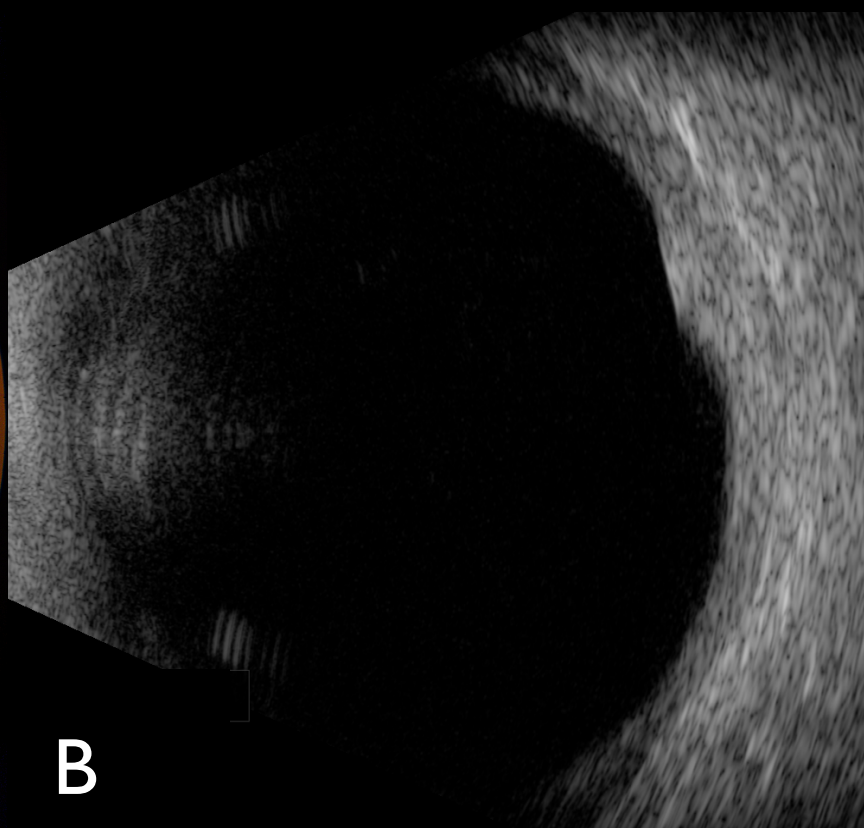
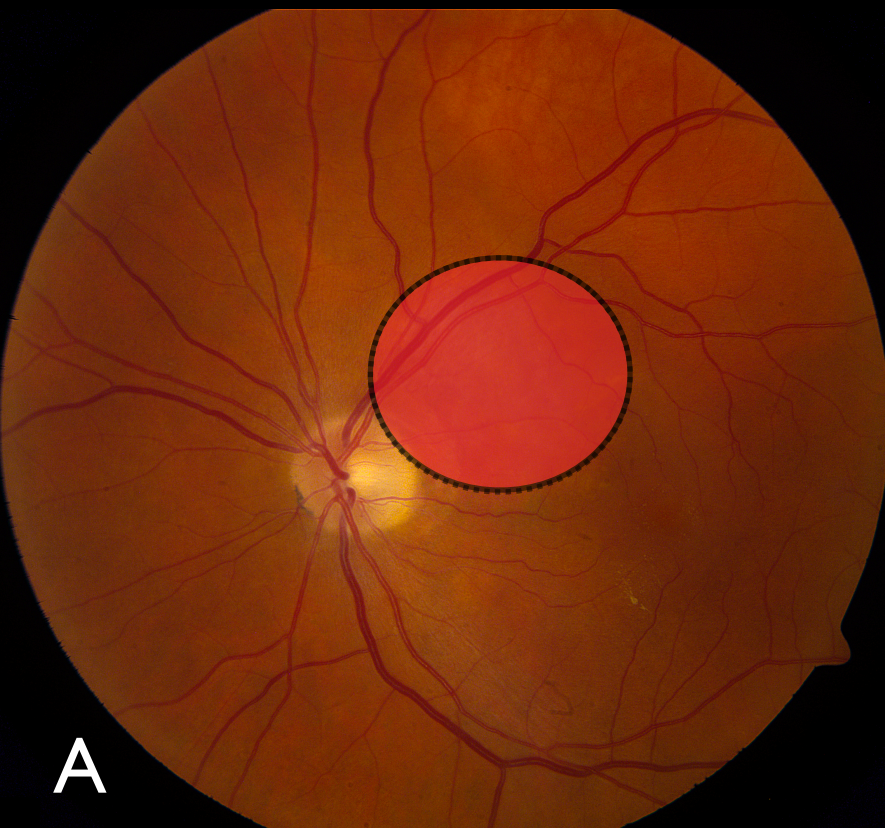


Post-PDT - Subfoveal



RPE alterations, but chronic SRF above likely to induce progressive vision loss.

Post-PDT - CME



Circumscribed Choroidal Hemangioma: Visual Outcome in the Pre-Photodynamic Therapy Era versus Photodynamic Therapy Era in 458 Cases

Q3Q2

Q10 Carol L. Shields, MD,¹ Lauren A. Dalvin, MD,² Li-Anne S. Lim, MD,¹ Michael Chang, MD,¹
Sanika Udyaver, BS,¹ Mehdi Mazloumi, MD, MPH,¹ Pornpattana Vichitvejpaisal, MD,³ Grace L. Su, BS,¹
Q4Q1 Eleni Florakis, BS,¹ Arman Mashayekhi, MD,¹ Jerry A. Shields, MD¹

Conclusions: Management of choroidal hemangioma in the PDT era has allowed for significantly better visual outcome compared with the pre-PDT era, with mean final visual acuity of 20/400 (pre-PDT era) versus 20/63 (PDT era). *Ophthalmology Retina* 2019;■:1–12 © 2019 by the American Academy of Ophthalmology

Main Outcome Measure: Visual acuity outcome.

Results: A total of 458 tumors were treated over this 51-year period. A comparison (pre-PDT [n = 220 cases] vs PDT [n = 238 cases]) showed significantly better visual outcome in the PDT era (p < 0.001).

Over 5 decades in 458 cases

pre-PDT

PDT

20/400

vs

20/63

p < 0.001

PDT wins



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In summary,
Over 5 decades in 458 cases of
circumscribed choroidal
hemangioma, we have made headway
with PDT providing significantly
better visual outcome

Circumscribed choroidal hemangioma: Visual outcome in the pre-PDT vs PDT eras in 458 cases



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