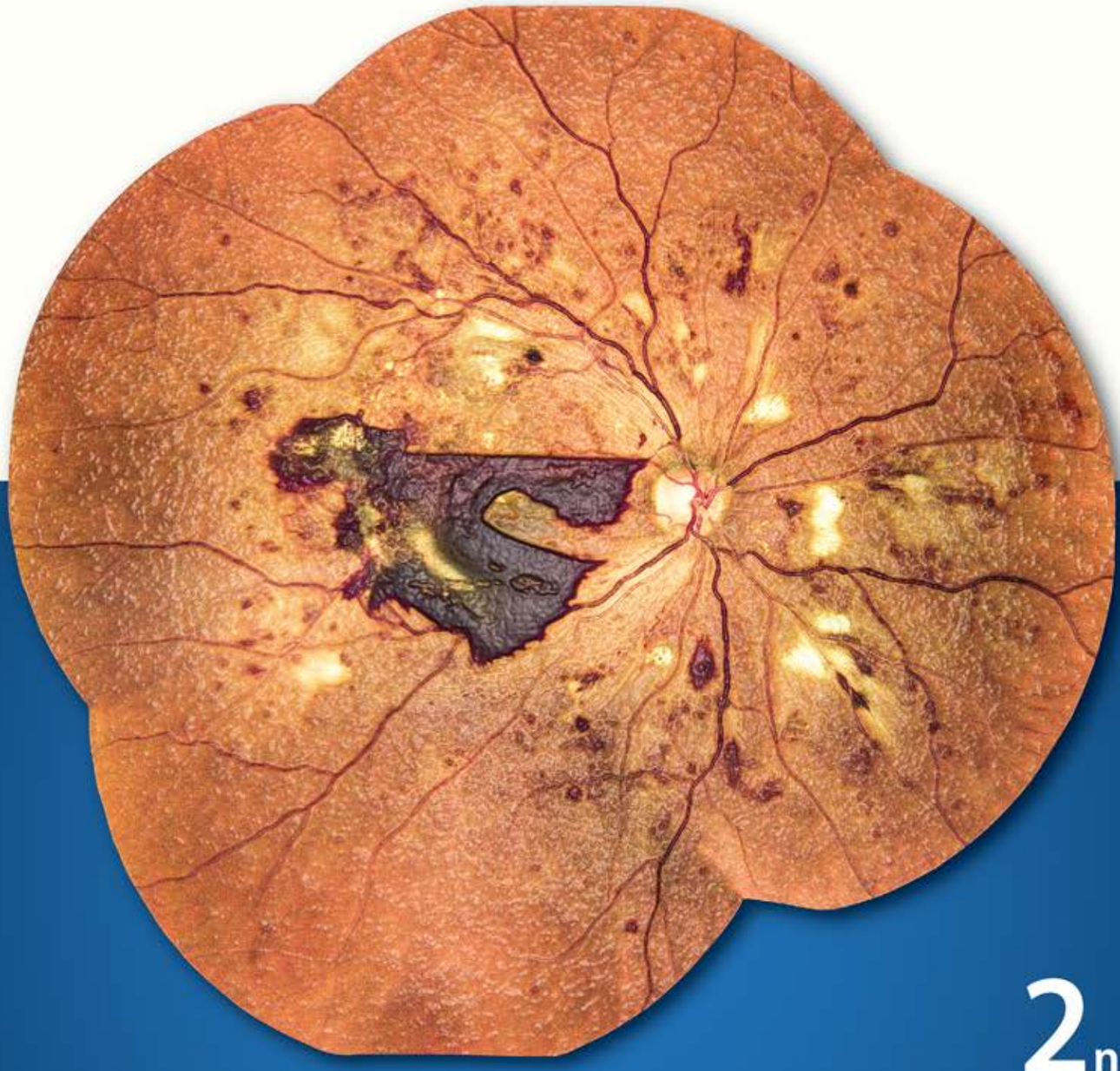
RETINA ATLAS



2nd Edition

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CHAPTER 3

RETINAL VASCULAR DISORDERS

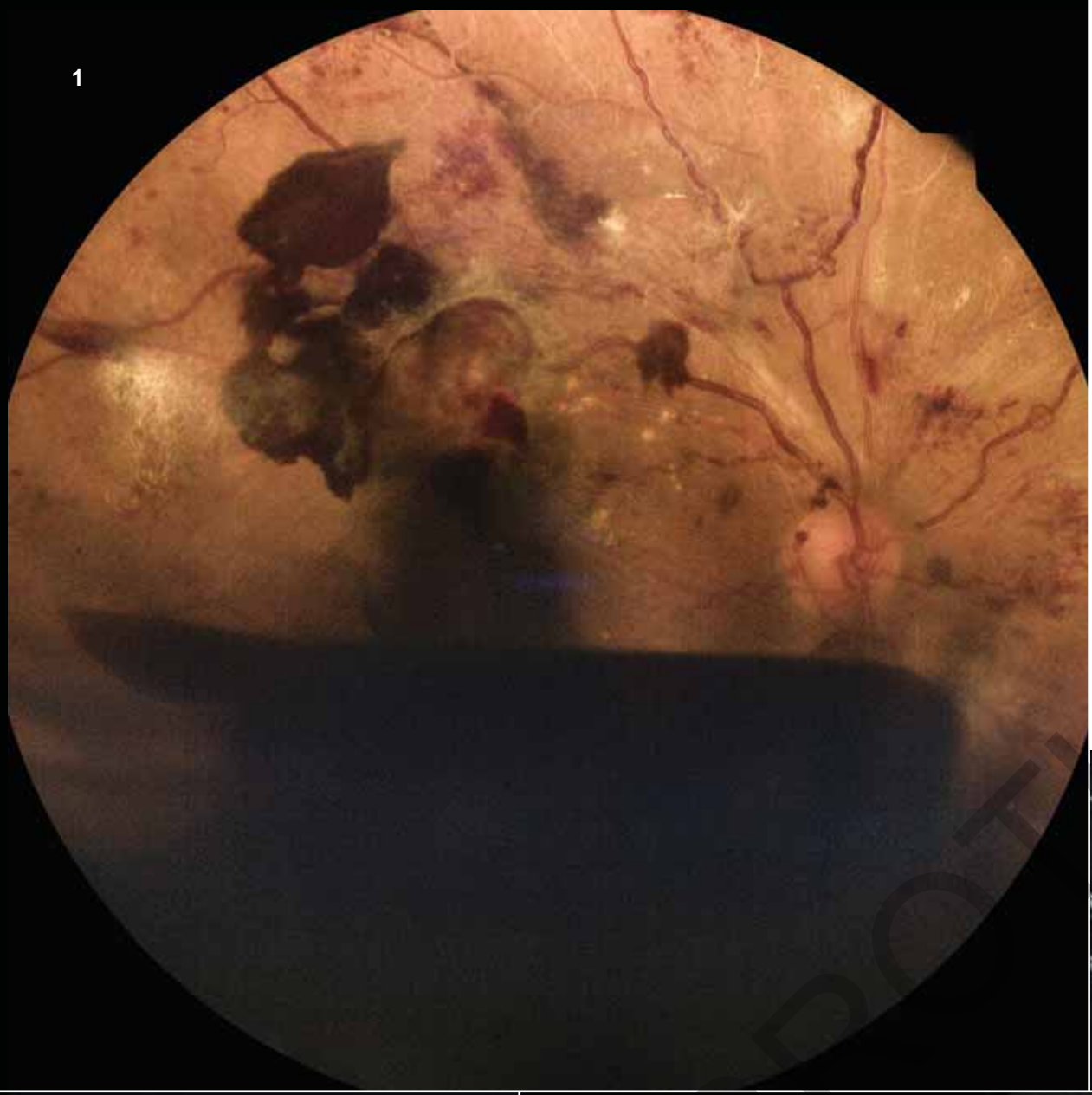
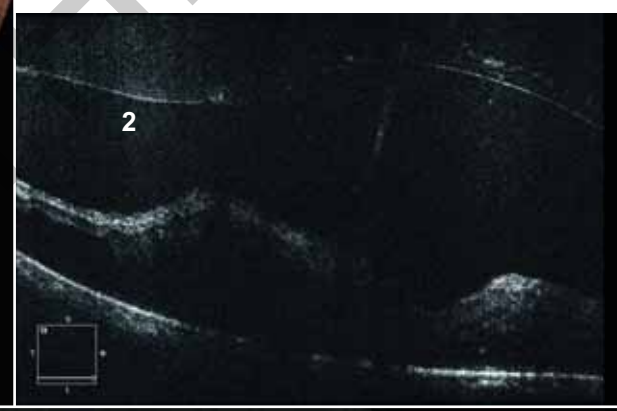


Figure 1

A 47-year-old male presented with history of decrease in vision in right eye for the last 4 months. Fundus photo shows advanced proliferative diabetic retinopathy, a preretinal dense dark red boat-shaped sub-hyaloid hemorrhage obscuring most of the view of macula. Superficial flame-shaped hemorrhages are seen in superior and superonasal quadrant of retina. Venous beading and diffuse arterial sclerosis are seen in visible areas of retina suggestive of severe retinal ischemia.

Figure 2

Preretinal hyper-reflective sub-hyaloid bleeding contained in the vitreous cavity is visible with thickening of underlying neurosensory retina suggestive of macular edema.



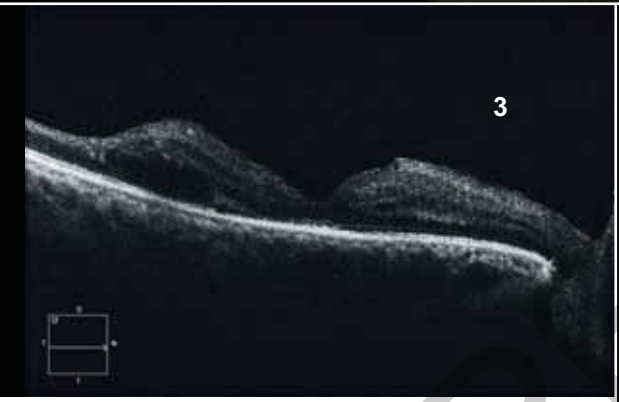


Figure 3

25-gauge pars plana vitrectomy was performed in his right eye with intraocular gas tamponade. Three weeks postoperatively media clarity is grade 1 and 360 degree endolaser marks can be seen. Remaining gas bubble can be seen in superior part of retina which will eventually diffuse out. Best corrected visual acuity was 6/36.

Figure 4

Postoperative OCT scan shows total resolution of preretinal bleed, good signal strength from retinal layers with clear media. There was persistence of mild macular thickening in perifoveal area at 2 months.□

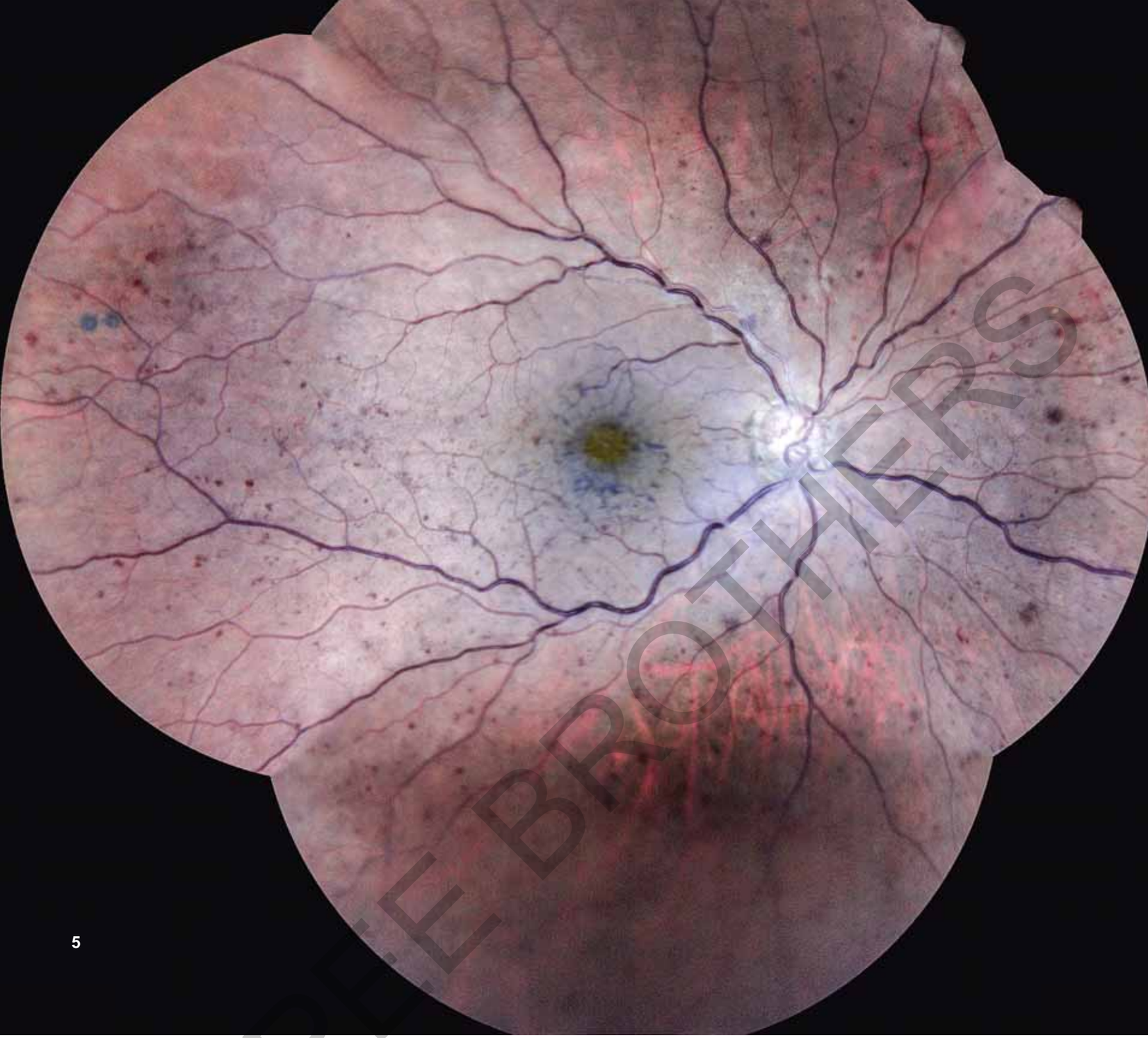


Figure 5 *Nonischemic variant of central retinal vein occlusion. Color fundus photograph of a case of nonischemic CRVO demonstrating intraretinal retinal hemorrhages in all four quadrants, minimal vascular tortuosity and macular thickening.*

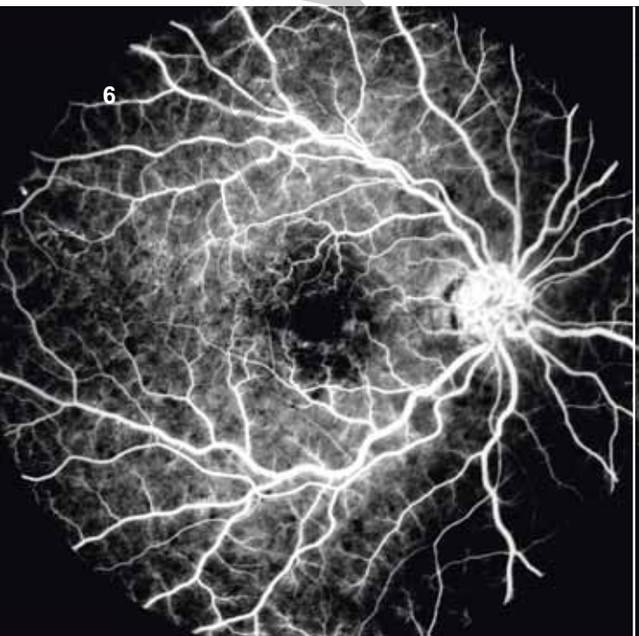


Figure 6

Early frame of angiogram demonstrating multiple hypofluorescent dots as a result of blockage of fluorescein dye due to underlying retinal hemorrhages. Also note intact perifoveal capillary network highlighting good perfusion in a case of nonischemic CRVO.

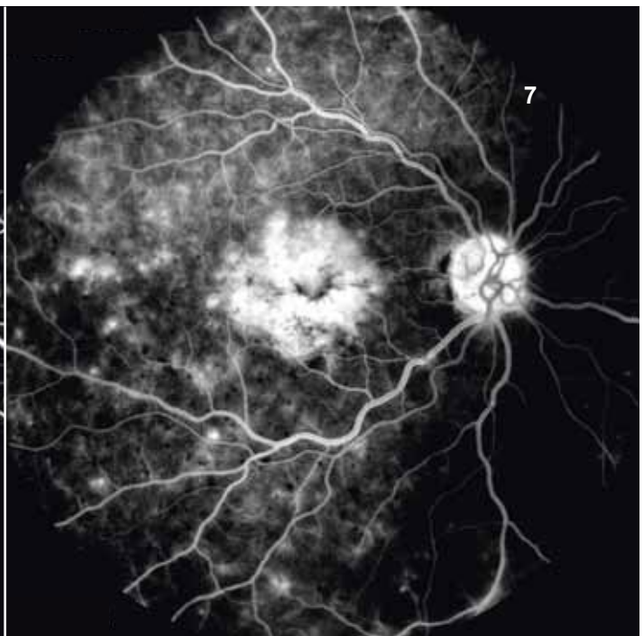


Figure 7

Late phase of fluorescein angiogram demonstrating petalloid leakage at the fovea due to cystoid macular edema.

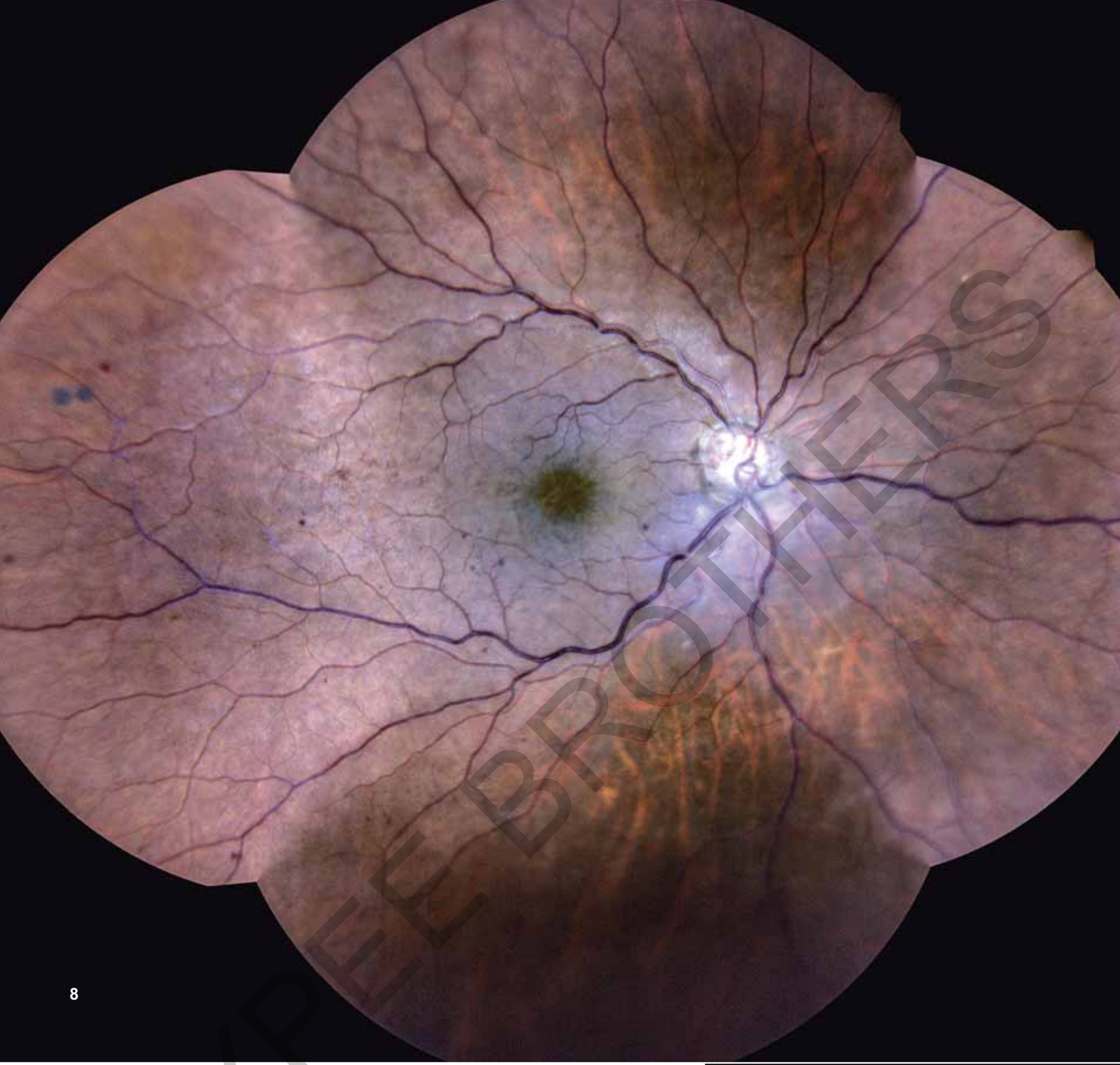


Figure 8 *Nonischemic variant of central retinal vein occlusion: 6 months after monthly intravitreal injections treatment.*

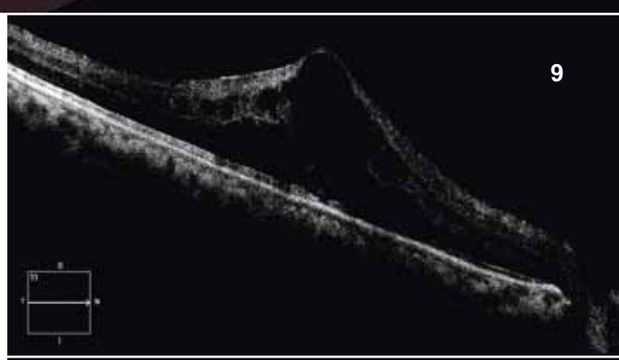


Figure 9 *Spectral domain OCT at the onset demonstrating intraretinal cystic fluid pockets due to macular edema associated with CRVO.*

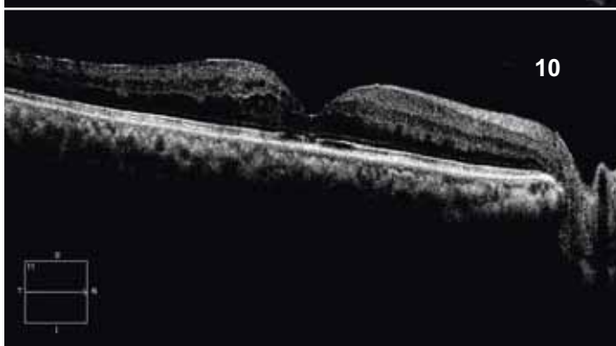


Figure 10 *Spectral domain OCT demonstrating reduction in the retinal fluid, restoration of normal foveal contour 6 months later. Minimal intraretinal cysts are still persisting.*

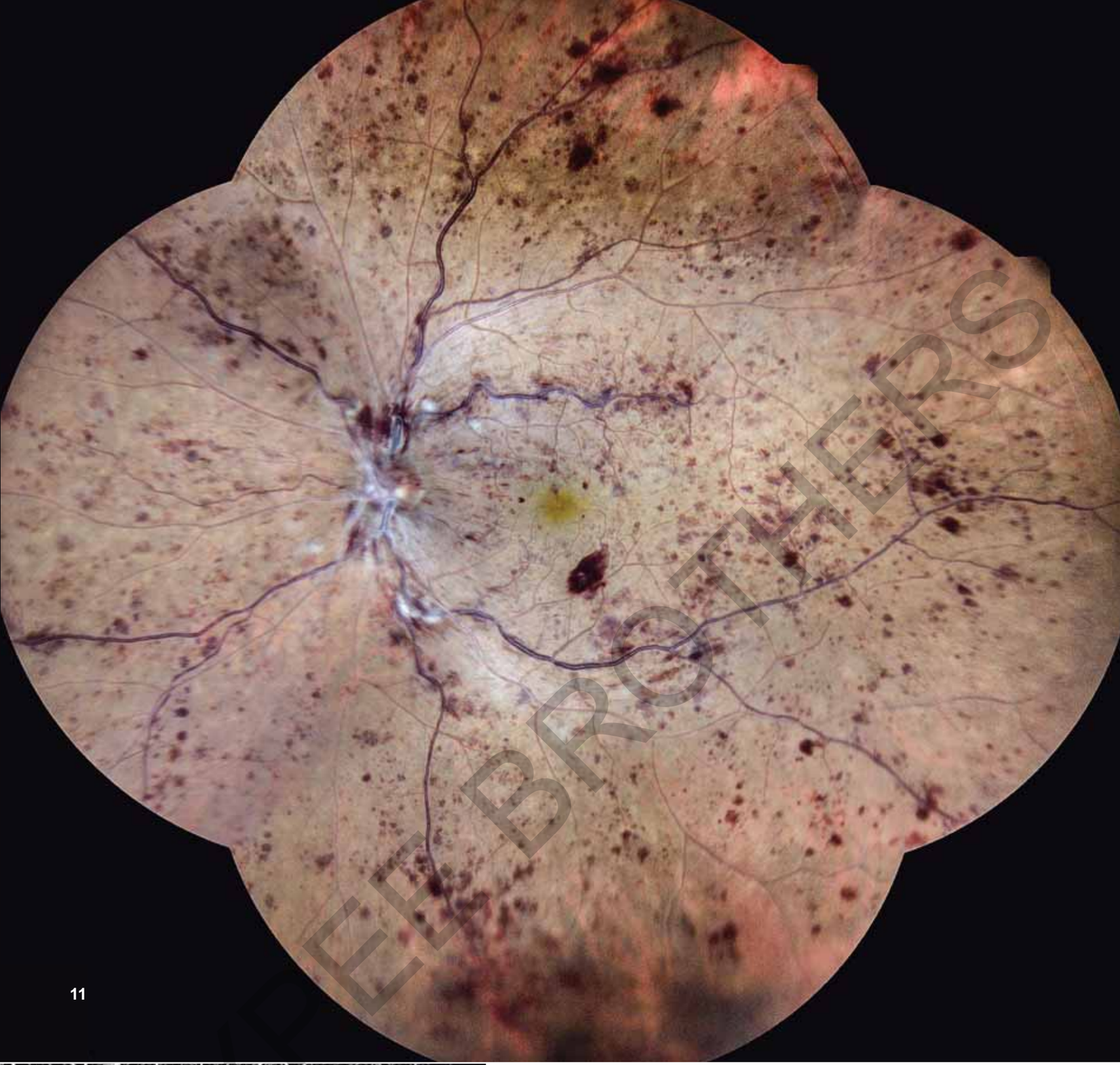


Figure 11 *Color fundus photograph of a nonischemic central retinal vein occlusion.*

Note the presence of multiple scattered intraretinal hemorrhages, tortuous vessels and few cotton wool spots.

Classification of CRVO into nonischemic and ischemic is essential because nonischemic CRVO is a relatively benign disease, with permanent central scotoma as a major complication from cystoid macular edema. There are functional (VA, RAPD) and morphological (fundus picture, FFA) tests to differentiate between ischemic and nonischemic.

Figure 12 *12 mm × 12 mm superficial slab of OCT angiography of central field shows few areas of nonperfusion (1).*

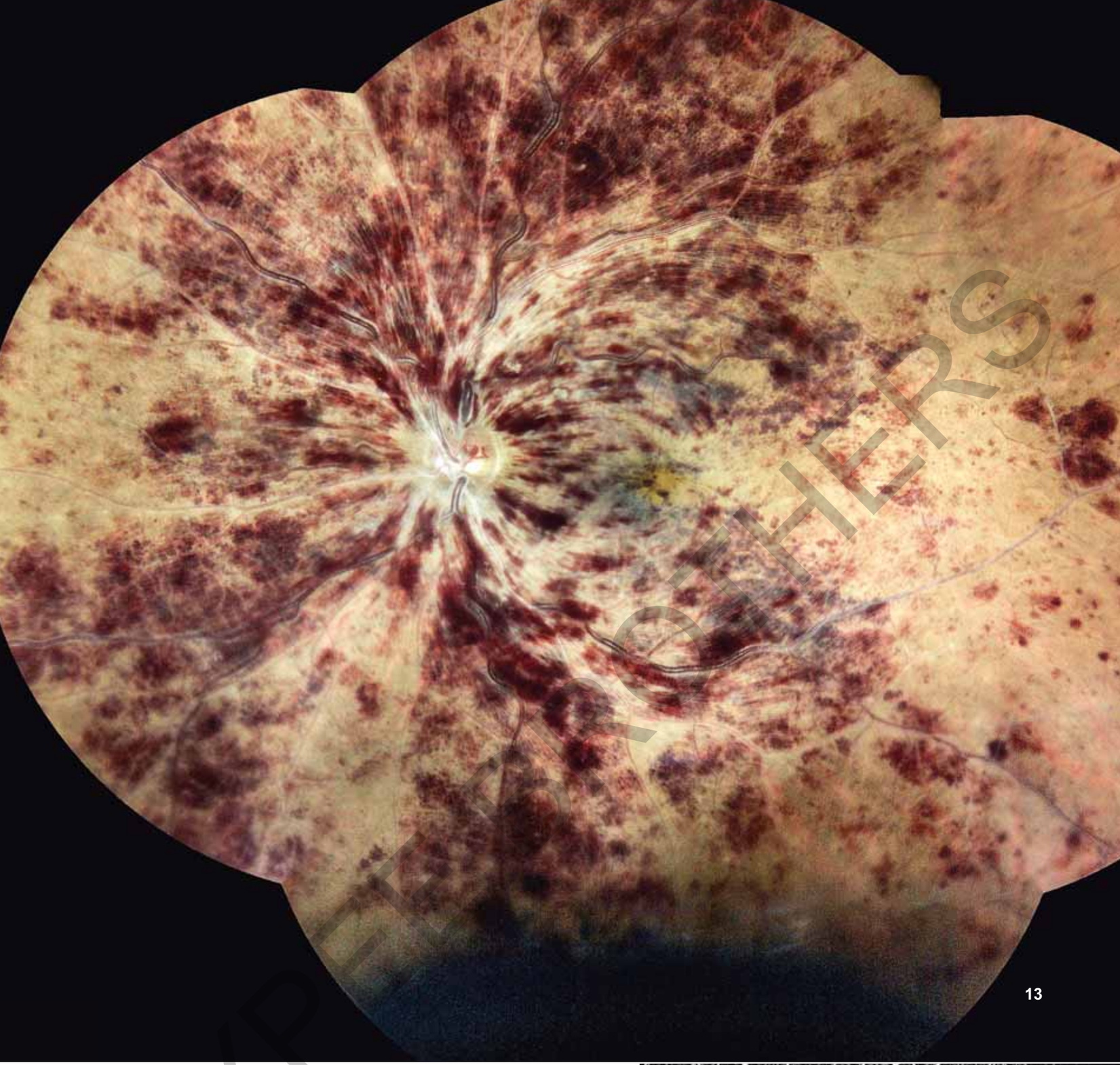


Figure 13 *Color fundus photograph demonstrating conversion to ischemic central retinal vein occlusion after 3 months.*

Note the presence of increase in the retinal hemorrhages, radiating from the optic disk in classic "blood and thunder" appearance. Landmark CVOS study has demonstrated cumulative chance of conversion of 13% within 18 months from baseline nonischemic CRVO at the onset to nonperfused ischemic CRVO. If there is a significant increase in the retinal hemorrhages it becomes necessary to assess retinal perfusion. But the major drawback of traditional FFA is that extensive hemorrhages will have a masking affect on retinal details. Such cases benefit from OCTA as it allows the retinal microvasculature to be visualized at various retinal depths.

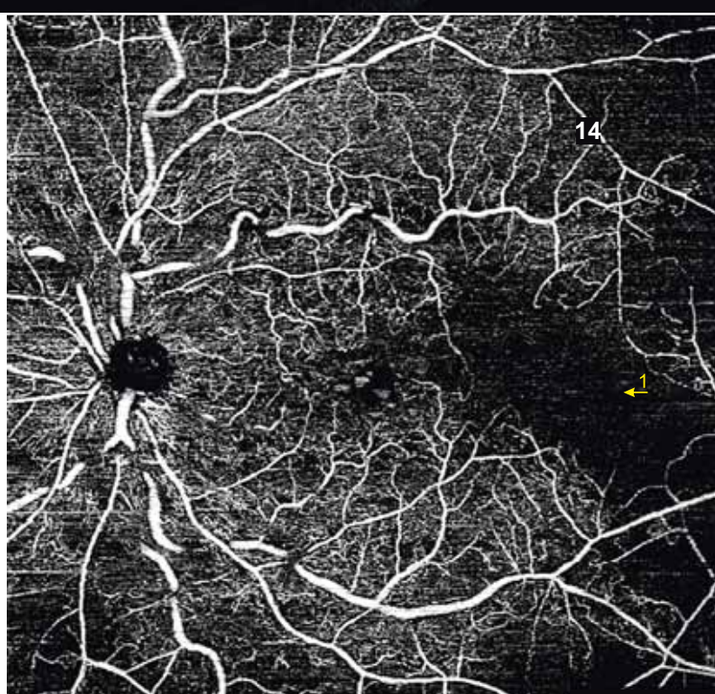


Figure 14 *12 mm × 12 mm OCT angiography image done 3 months later demonstrates a wider field of nonperfusion of retinal vasculature in the temporal macula, indicating progressive ischemic (1).* □

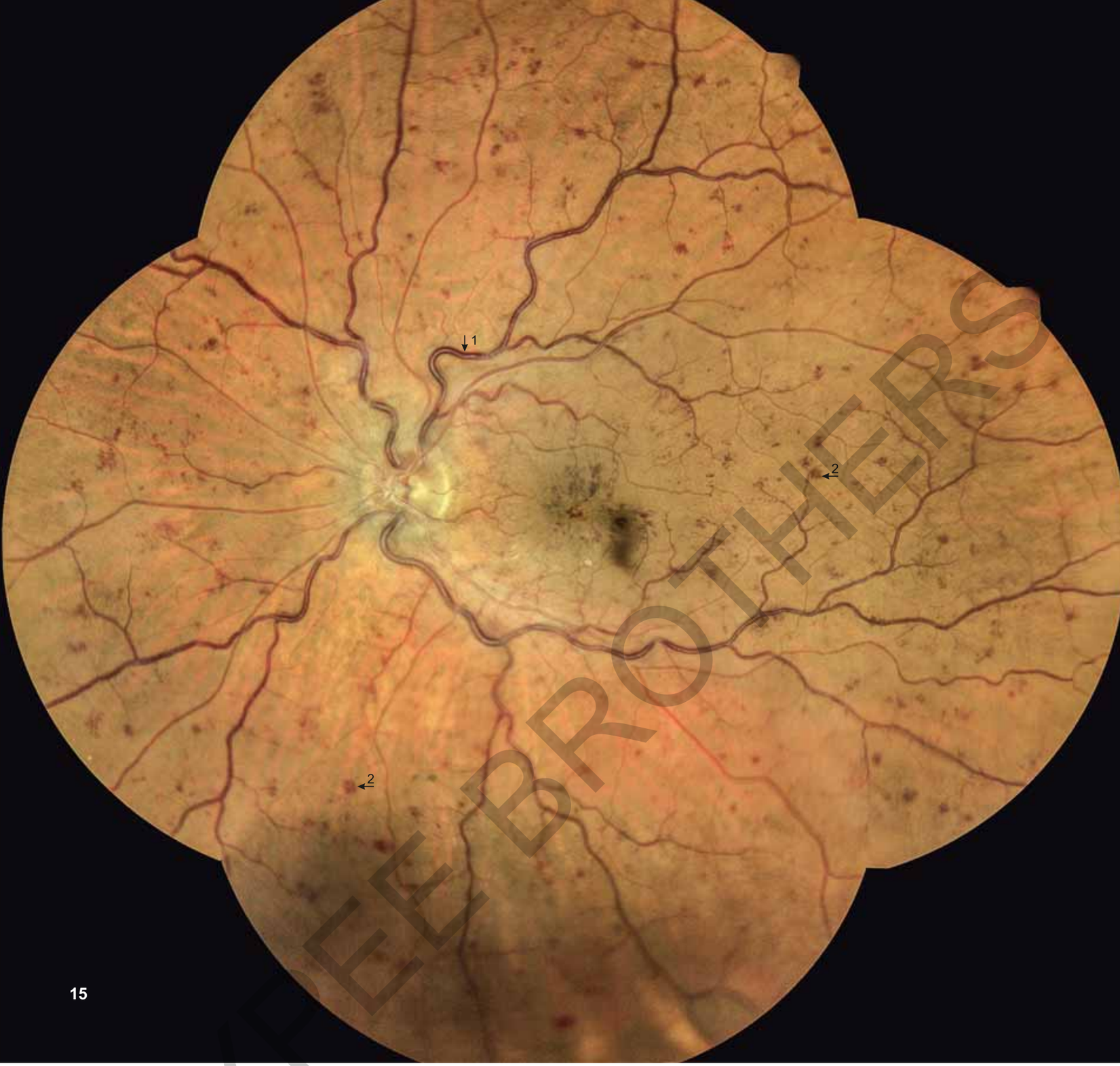


Figure 15 *Color fundus photograph of an eye with central retinal vein occlusion (CRVO) demonstrating typical features of venous tortuosity (1), macular thickening and intraretinal hemorrhages (2) in all four quadrants of the fundus.*

CRVO is a retinal vascular condition that is commonly seen in patients above 65 years. Diabetes, hypertension, hyperlipidemia and associated glaucoma are the common risk factors, although hypercoagulation hematological disorders and autoimmune vasculitis are also known causes especially in patients with younger age of presentation. It is usually a unilateral disease, however annual risk of developing any type of retinal vascular occlusion in the fellow eye is approximately 1% per year.

CRVO usually occurs due to thrombotic occlusion of central retinal vein. The most common symptom is sudden onset of painless blurred vision. With time, the extent of retinal hemorrhage may decrease or resolve completely with resultant retinal pigment epithelium alterations. The time course for resolution of the hemorrhages varies and is related on the amount of hemorrhages produced by the occlusion. Macular edema usually persists after resolution of hemorrhages. □

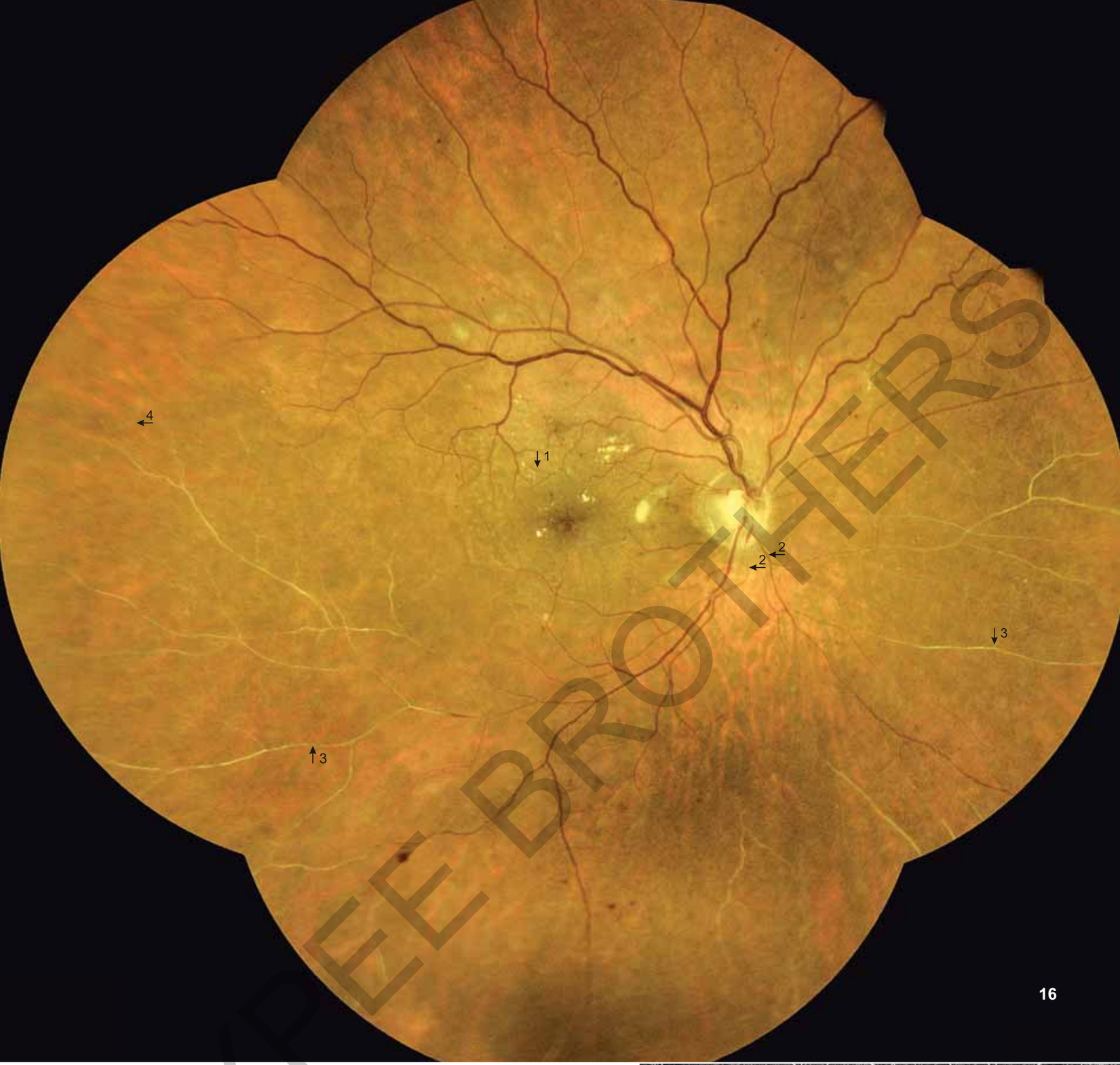


Figure 16 *Case of ischemic hemiretinal vein occlusion with moderate nonproliferative retinopathy and diabetic macular edema (treated with macular laser).*

Color fundus montage of a 65-year-old diabetic male with moderate nonproliferative diabetic retinopathy. He had been previously treated with macular grid laser. Macular laser scars (1) are seen at the posterior pole. There are a few resolving hard exudates and cotton wool spots. Retinal vascular caliber was normal in superior hemisphere. However generalized attenuation of artery and vein is seen as they originates from lower margin of the optic disk (2). Also note sclerosed retinal veins supplying the retinal periphery (3) with silent retinal mid-periphery due to massive capillary nonperfusion (4).

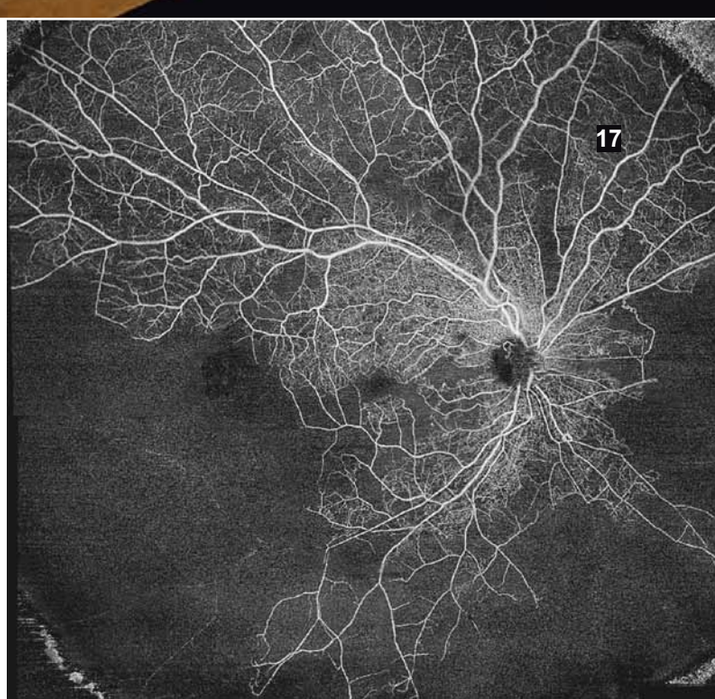


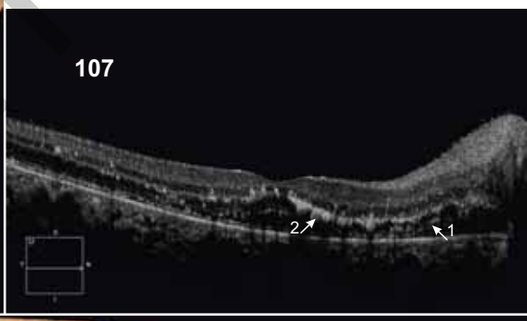
Figure 17 *12 mm × 12 mm OCT angiography at the level of superficial capillary plexus demonstrating loss of retinal vasculature due to nonperfusion of the inferior half of the retina.* □

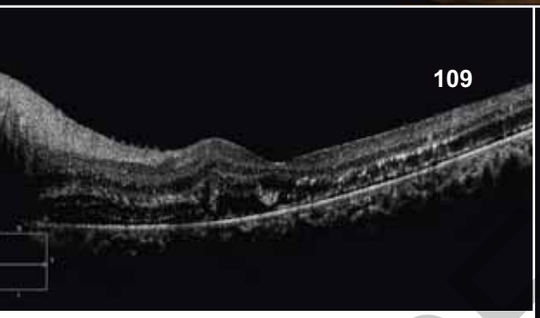
Figure 106

Hypertensive retinopathy with macular star. Right eye wide field fundus montage image in a young 25-year-old female with recent kidney transplant secondary to hypertension. Note the presence of yellow retinal exudate at fovea, perifoveal region (1), splinter-shaped peripapillary hemorrhage (2) and few round deep intraretinal hemorrhages (3). Optic disk appears edematous (4).

Figure 107

Spectral domain OCT scan in a case of hypertensive retinopathy. Note the diffuse increased hyporeflectivity of outer nuclear and outer plexiform layers (1). Multiple tiny hyperreflective dots (2) represents retinal lipid exudation. Also note diffuse thickening of the peripapillary optic disk region representing optic disk edema.





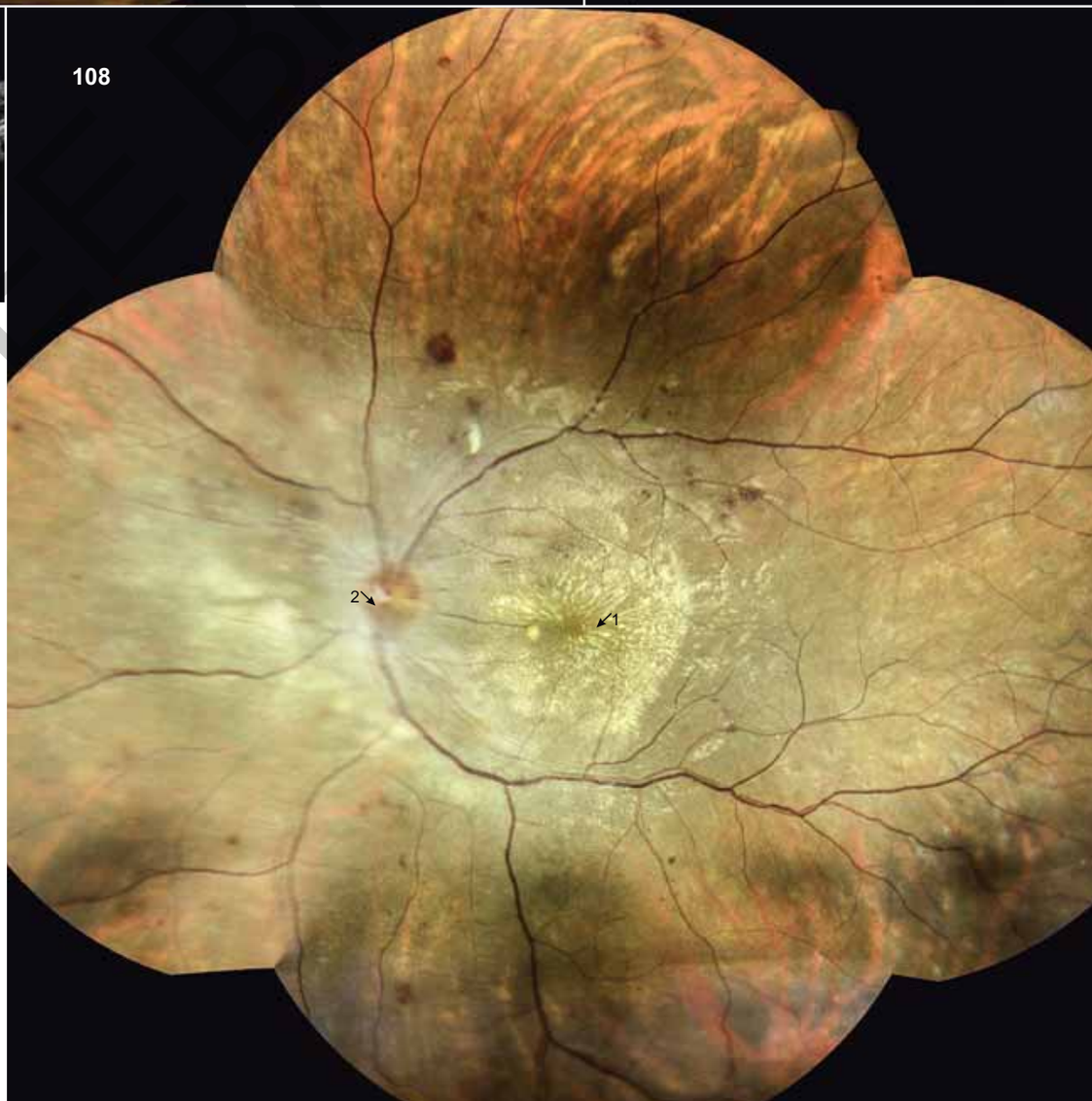


Figure 108

Color fundus montage image of left eye of same patient with hypertensive retinopathy. Note the bilaterally symmetrical retinal findings of macular star (1) and optic disk edema (2).

Figure 109

SD-OCT scan of left eye of same patient with macular star secondary to hypertensive retinopathy.

Note: Hypertensive retinopathy is usually a self-limiting condition and does not require any local treatment. Priority should be given to urgent control of hypertension and patient should be referred to local physician for management of hypertension. □

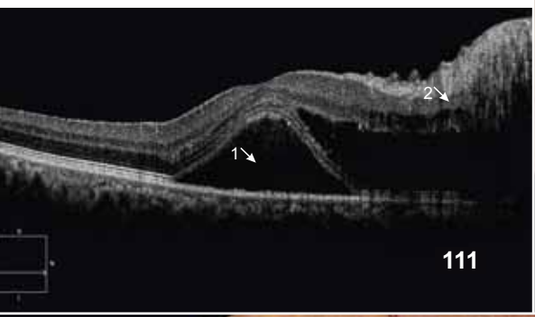
A case of malignant hypertension.

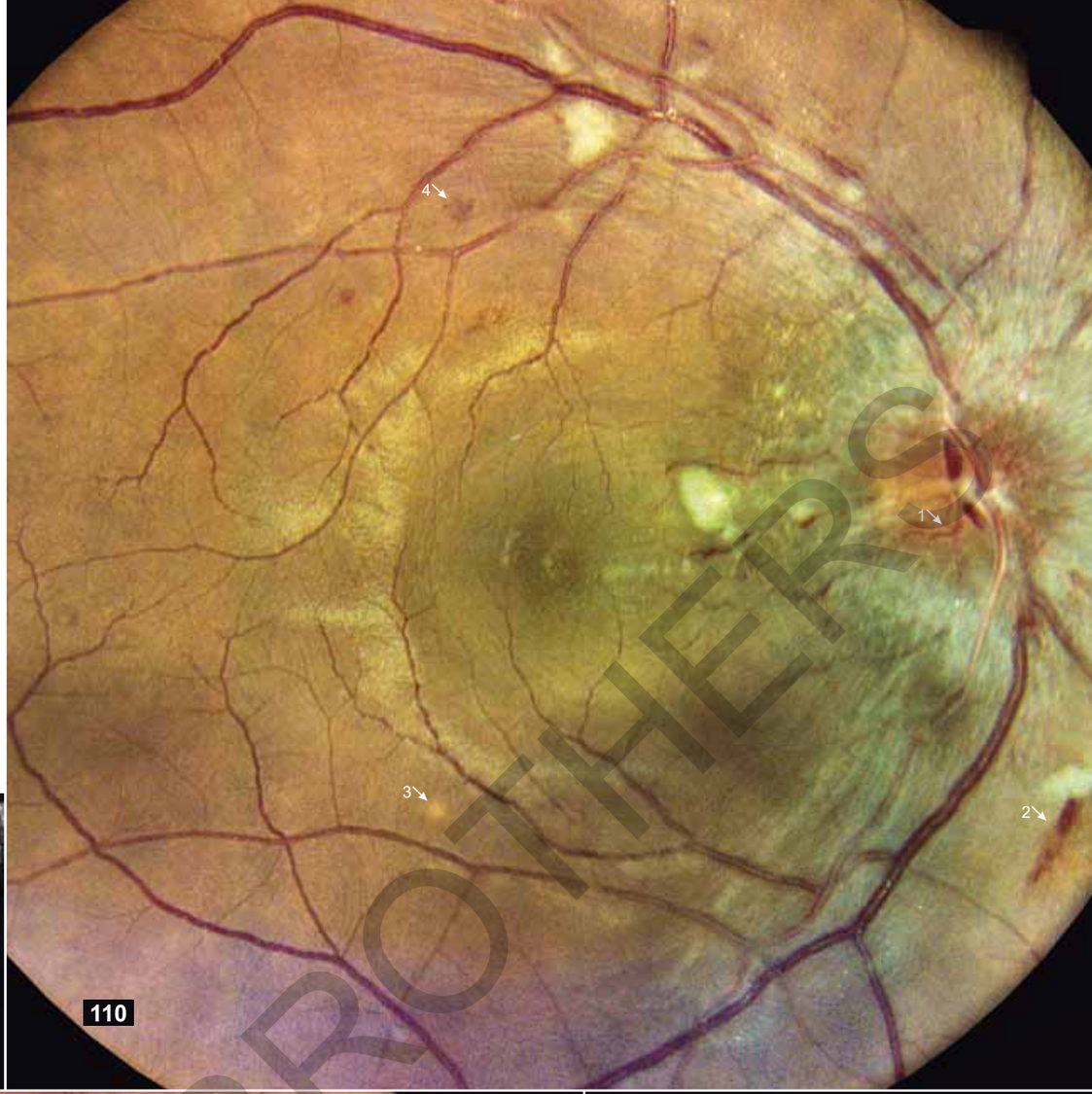
Figure 110

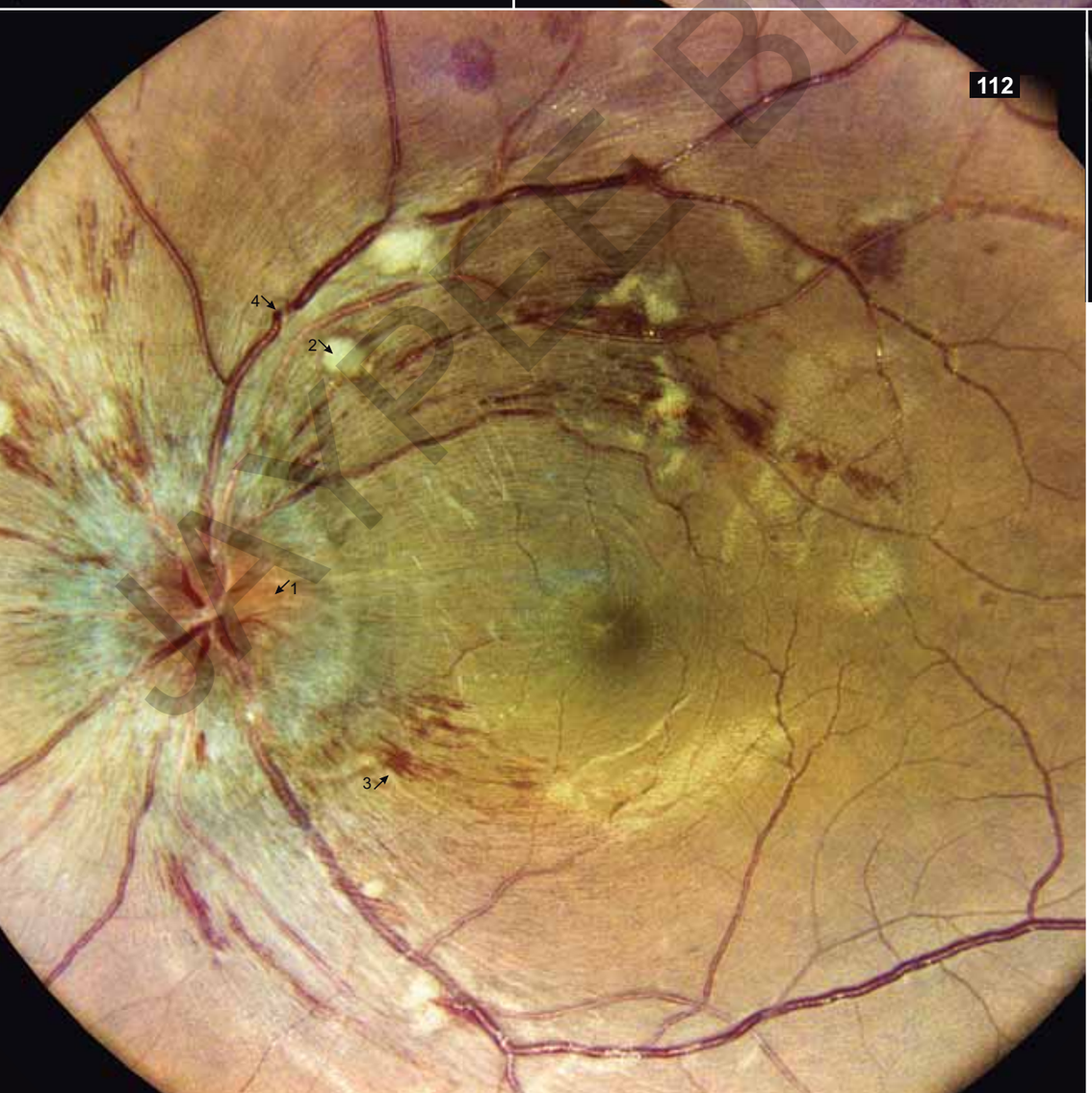
Color fundus image demonstrating papilloedema (1) multiple splinter hemorrhages (2) whitish fluffy cotton wool spots (3) and few intraretinal hemorrhage (4).

Figure 111

SD-OCT scan demonstrating serous macular detachment (1) and peripapillary retinal edema (2) in a case of malignant hypertension.







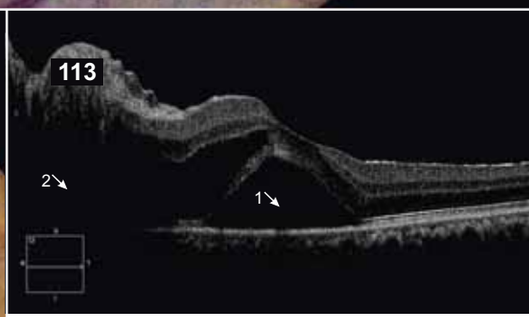


Figure 112

Color fundus image of left eye of same patient with malignant hypertension demonstrates bilateral symmetrical clinical findings—optic disk has sign grade 4 papilloedema with blurred margin (1) disk hyperemia elevated along with cotton wool spots (2) splinter hemorrhages (3). Also note venous tortuosity with nicking (4).

Figure 113

SD-OCT scan of left eye of the same patient with malignant hypertension. Peripapillary intraretinal edema (1) and serous fluid at fovea (2) can be seen. □

RETINA ATLAS

We present to you an atlas of common retinal disorders compiled using our collection of retinal imaging on Eidon. We have added OCT to help aid in understanding the pathology in a better way. Being an atlas, a greater space has been allocated to pictures with just little and necessary text. Enjoy the details in photographs. Look at the details and plethora of lesions visible. A picture shows much more in a shorter time than a fundus examination reveals. It is an unmatched documentation to follow the disease progression or recovery. This book is for every ophthalmologist to review the fundus pathologies and great for residents and students.

SPS Grewal MBBS MD is a graduate and a postgraduate from Government Medical College, Patiala, Punjab, India. He pursued his training in retina at Postgraduate Institute of Medical Education and Research (PGIMER), Chandigarh, and completed a WHO Fellowship in Moorfields Eye Hospital, London, UK. He won the Col Rangachari Gold Medal for best research paper at 10th Annual Conference (1989) of All India Ophthalmology, Mumbai. He has over 150 National and International Publications, and Instruction courses at All India Ophthalmological Society (AIOS), European Society of Cataract and Refractive Surgeons (ESCRS) and the American Academy of Ophthalmology (AAO). He was awarded the Sante Vision Award (2008) from AIOS. He also won the "Achievement Award" and "International Scholar" award at the AAO in 2012 and 2014, respectively. His move from academics to private practice in 1993, was accompanied by a shift from posterior segment to anterior segment, though retina remains his true passion. He is currently heading Cataract and Refractive Services, Grewal Eye Institute, Chandigarh, and remains in touch with teaching residents as an Adjunct Professor, Department of Ophthalmology, Feinberg School of Medicine, Northwestern University, IL, USA.

Manpreet Brar MBBS MS completed her graduation and postgraduation in India. She had her training at Moorfield Eye Hospital, London, UK, and Fellow in Vitreo Retina, University of California, San Diego, USA. She is a combination of pleasant personality, good human being, professionally competent and sincere to patients. Her empathy towards patients is remarkable. Having moved backed to India from United States after training, she has struck to the ethos of good clinical practices. She has an academic bent of mind and critically looks at our patient pool to think about new ideas and publication. She is Senior Consultant, Department of Vitreoretinal Diseases and Surgery, Grewal Eye Institute, Chandigarh, India.

Mansi Sharma MBBS DNB FAICO is a young and vibrant ophthalmologist with great surgical skills is an asset to any organization across the globe. During her training, she had a chance to work under great surgical masters to hone up her skills, and understand the finer nuances of vitreoretinal surgery. Her expertise in surgery is evident from the preoperative and postoperative photographs of cases operated by her. She is a person who believes in a balanced life and ambidextrous living. She plays an important role to make the vitreoretinal team a cohesive force. She is Consultant, Department of Vitreoretinal Diseases and Surgery, Grewal Eye Institute, Chandigarh, India.

Mangat R Dogra MBBS MS is known to his friends and colleagues as a smiling face. Coming from a humble background, he has risen to head one of the best department of ophthalmology at Postgraduate Institute of Medical Education and Research (PGIMER), Chandigarh, India. After training at one of the best institutes in India and United States, he decided to come back and serve the country. He has been the pioneer to work on retinopathy of prematurity. He has dedicated his life to the tiny tots. He has immensely contributed to world literature in the field of Retinopathy of Prematurity (ROP). He has described new presentations of ROP for the first time which has been acknowledged by the world. His empathy towards patients is remarkable. He is the Director, Department of Vitreoretinal Diseases and Surgery, Grewal Eye Institute, Chandigarh, India.

Dilraj S Grewal MBBS MD is a graduate from Armed Forces Medical College (AFMC), Pune, Maharashtra, India, he developed the knack of publication from his time of internship. After graduation, he moved to United States and did Research Fellowship from Bascom Palmer Eye Institute, University of Miami, FL, USA. He completed his residency from Northwestern University Feinberg School of Medicine, Chicago, IL. He did his Vitreoretinal Surgery Fellowship from Duke Eye Center, Duke University Medical Center Durham, NC. He is presently working as an Associate Professor, Department of Ophthalmology, Vitreoretinal Surgery and Uveitis, Duke Eye Center, Duke University Medical Center, Durham, NC. The numerous accolades, he has won include American Academy of Ophthalmology Achievement Award; TEDMED 2013 Front Line Scholarship; American Society of Cataract and Refractive Surgery Foundation Resident Excellence Award; Beem Fisher Award; Heed Fellow, Heed Ophthalmic Foundation; Fellow, Society of Heed Fellows; Rhett Buckler Award, American Society of Retina, Ronald G Michels Fellowship Foundation Award and American Society of Retina Specialists Honor Award. He has more than 100 publications in peer-reviewed journals besides a large number of presentations, videos, posters, and lectures. He has done pioneer and original work on transplantation of neural retina for large macular holes which has now been followed by many surgeons across the world.

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