

A circular fundus photograph of a human retina, showing a complex network of red and orange blood vessels branching across the field of view. The vessels are set against a lighter, orange-brown background of the retinal tissue.

**WHAT TO DO WHEN STROKE HITS THE EYES**

# **RETINAL STROKES**

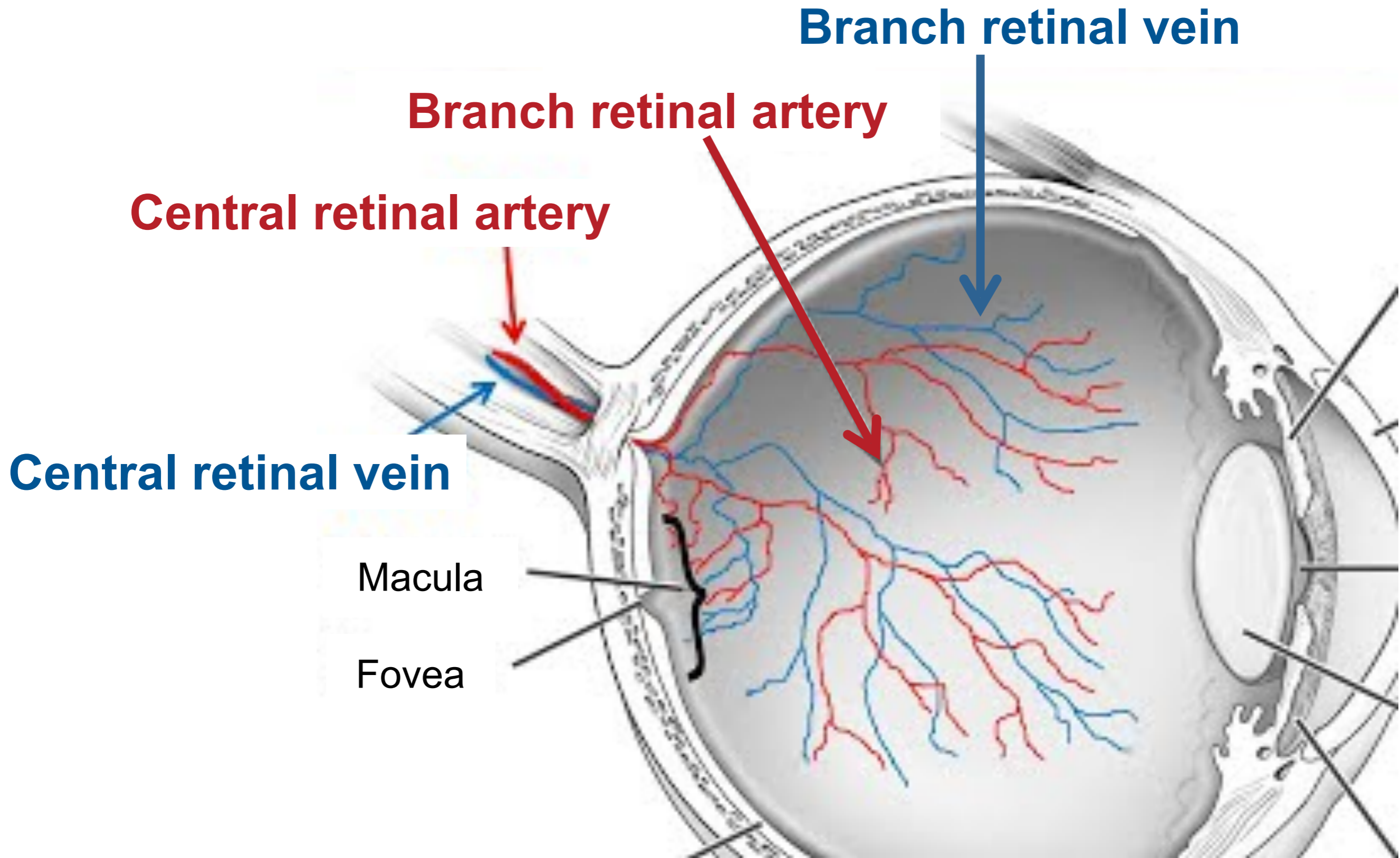
**Ophthalmologist's Perspective**

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# DEFINITION OF ISCHEMIC STROKE

*"An episode of neurological dysfunction caused by focal cerebral, spinal or RETINAL infarction"*

# Retina Blood Supply



# Disturbance of Retinal Blood Flow

## Transient obstruction

- Amaurosis fugax

## Permanent obstruction

### Arterial occlusion

- Branch retinal artery occlusion (BRAO)
- Central retinal artery occlusion (CRAO)
- Ophthalmic artery occlusion (OAO)

### Venous occlusion

- Branch retinal vein occlusion (BRVO)
- Central retinal vein occlusion (CRVO)

# RETINAL ARTERY OCCLUSION PATHOGENESIS

## 1. Emboli\*\*\*

- cholesterol emboli (75%)
- platelet-fibrin emboli (15%)
- calcific emboli (10%)
- septic emboli, cosmetic facial filler

## 2. Thickening of vascular wall (arteritic RAO)

- autoimmune & inflammatory disorders (GCA)

## 3. Optic n. compression (CRAO)

- tumor, hematoma

# **R**ETINAL **A**RTERY **O**CCLUSION WHEN TO SUSPECT

## **SYMPTOMS**

- Unilateral acute painless visual loss
- Sudden decreased of VA and VF over a period of seconds

## **INITIAL EYE EXAMINATION**

- Decrease of VA (commonly 20/200 to counting finger)
- RAPD positive

## **PATIENTS AT RISK**

old age, cigarette smoking, hypertension, high body mass index, high serum lipid levels, diabetes, cardiac disease

# RETINAL ARTERY OCCLUSION

## HOW TO DIAGNOSE

Normal

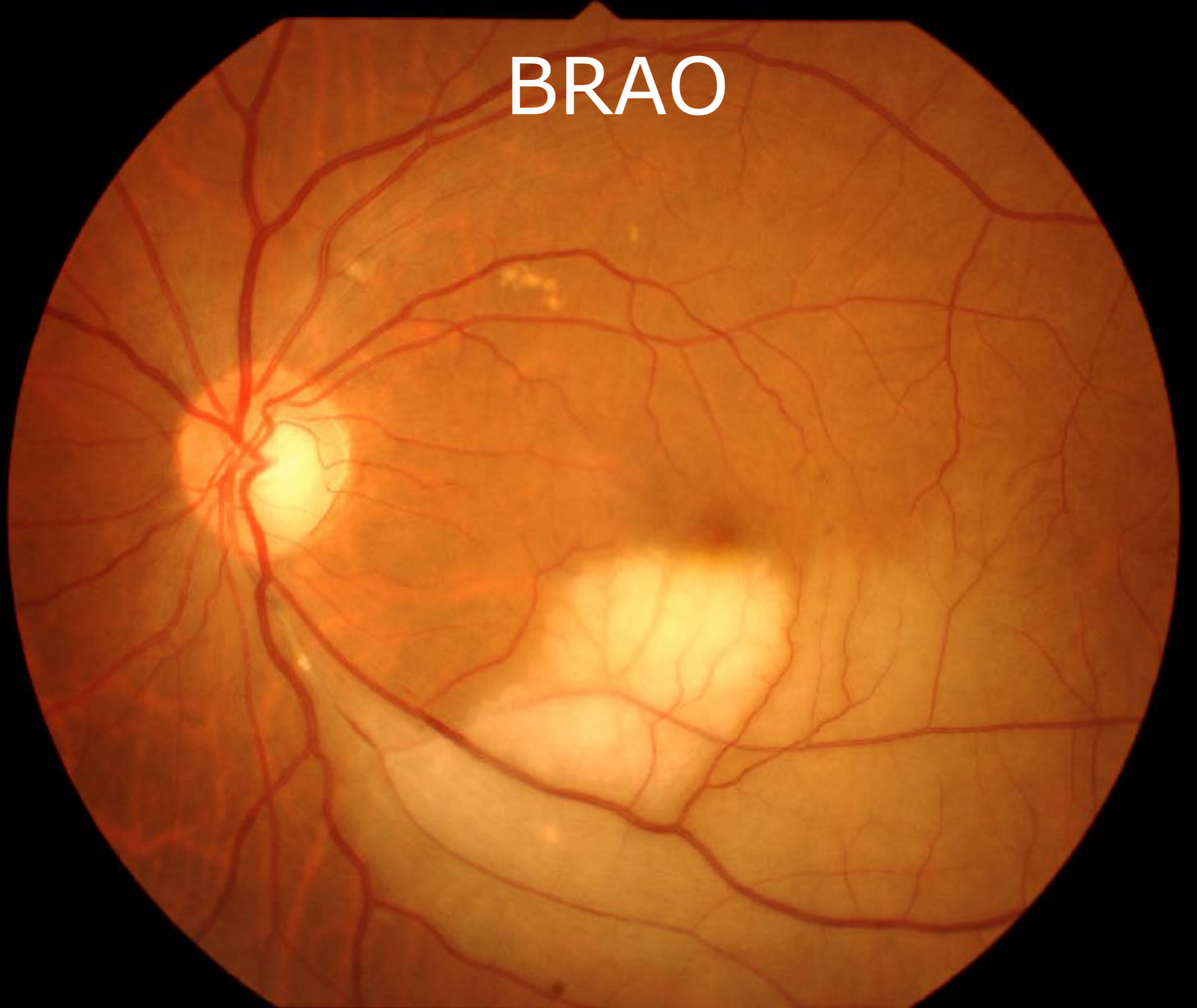


CRAO



Whitening of retina  
with "cherry red spot"

BRAO





**Retinal Emboli**



# RETINAL ARTERY OCCLUSION MANAGEMENT

*\*\*\*No level 1 evidence supports RAO Rx\*\*\**

1. Restore retinal circulation
  - Reduction of intraocular pressure
    - A/C paracentesis, ocular massage, IOP lowering medications
  - Nd-YAG embolysis, IA/ IV thrombolytics
2. Increase oxygenation of retinal tissue
  - Carbogen (95% O<sub>2</sub>+5% CO<sub>2</sub>)
  - Hyperbaric oxygen therapy
3. Systemic evaluation looking for the cause of emboli and risk of subsequent stroke

# R ETINAL V EIN O CCLUSION PATHOGENESIS

1. Thrombosis\*\*\*
2. Blood dyscrasia
  - hypercoagulable states
  - hematologic malignancy
3. Optic n. compression
  - tumor, hematoma

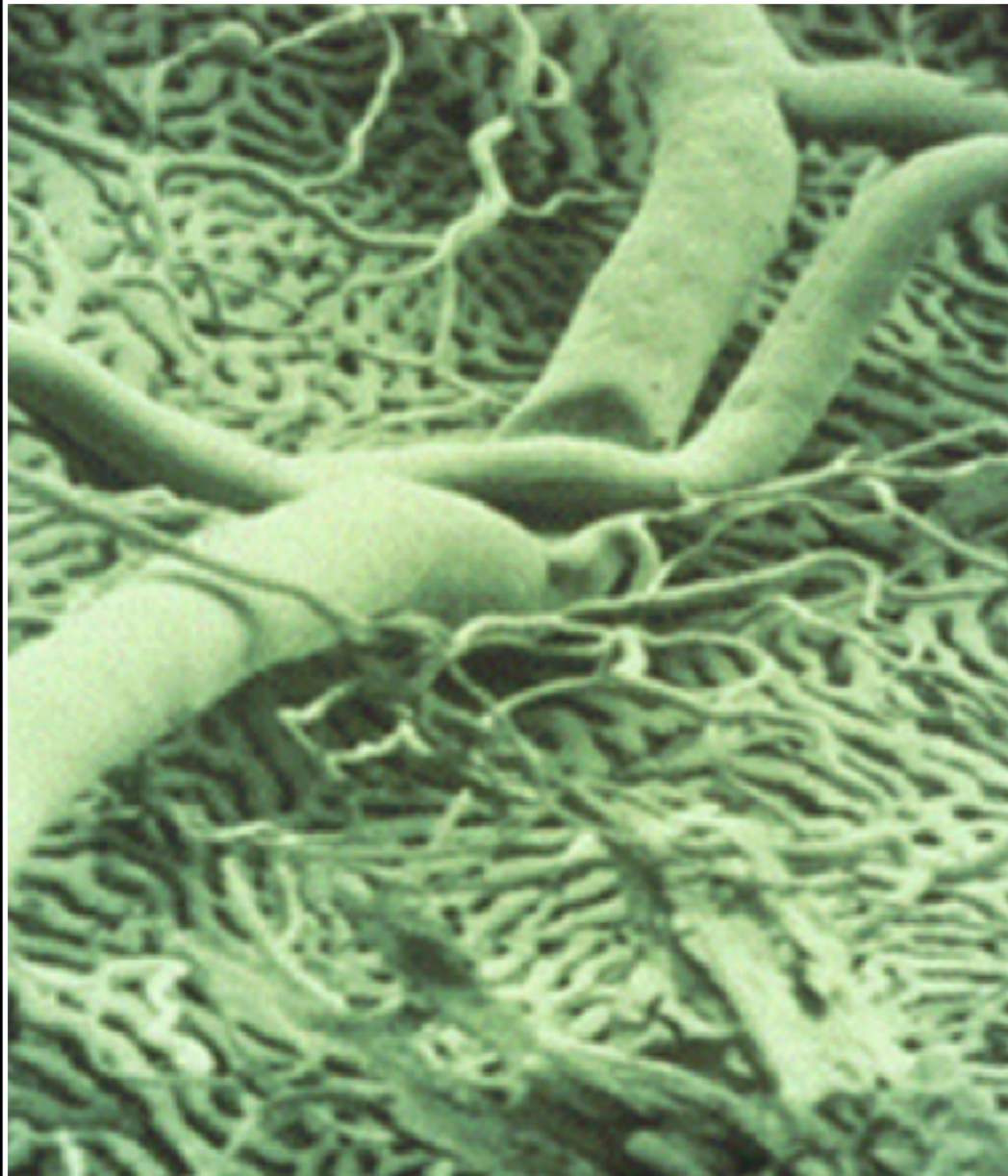
# Thrombus Formation in Retinal Vein

## AV CROSSING

Compression of venous lumen  
by retinal arteriole



Thrombus formation

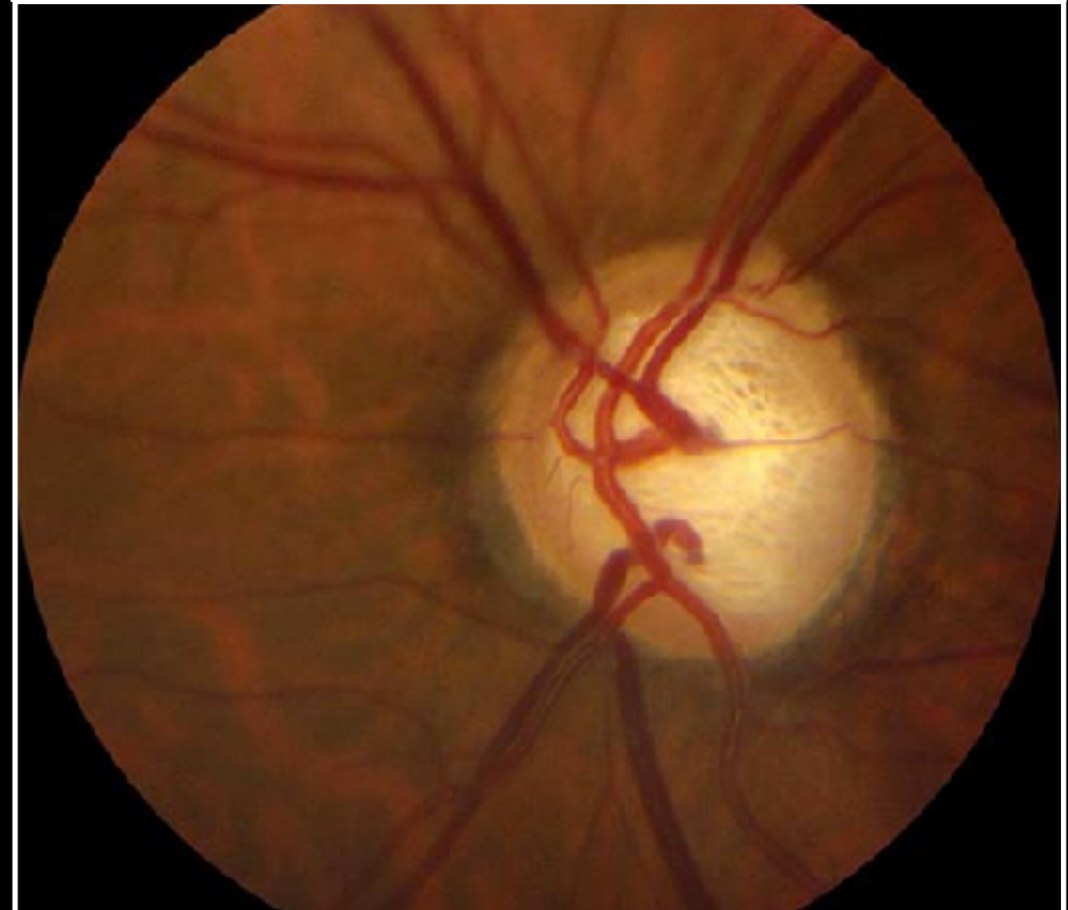


## GLAUCOMATOUS DISC

Distension of lamina cribrosa



Venous compression and  
thrombus formation



# RETINAL VEIN OCCLUSION

## WHEN TO SUSPECT

### SYMPTOMS

- Unilateral painless visual loss
- Variation of visual disturbance

### INITIAL EYE EXAMINATION

- Variation of VA (range from 20/20 to counting finger)
- RAPD positive only in severe case

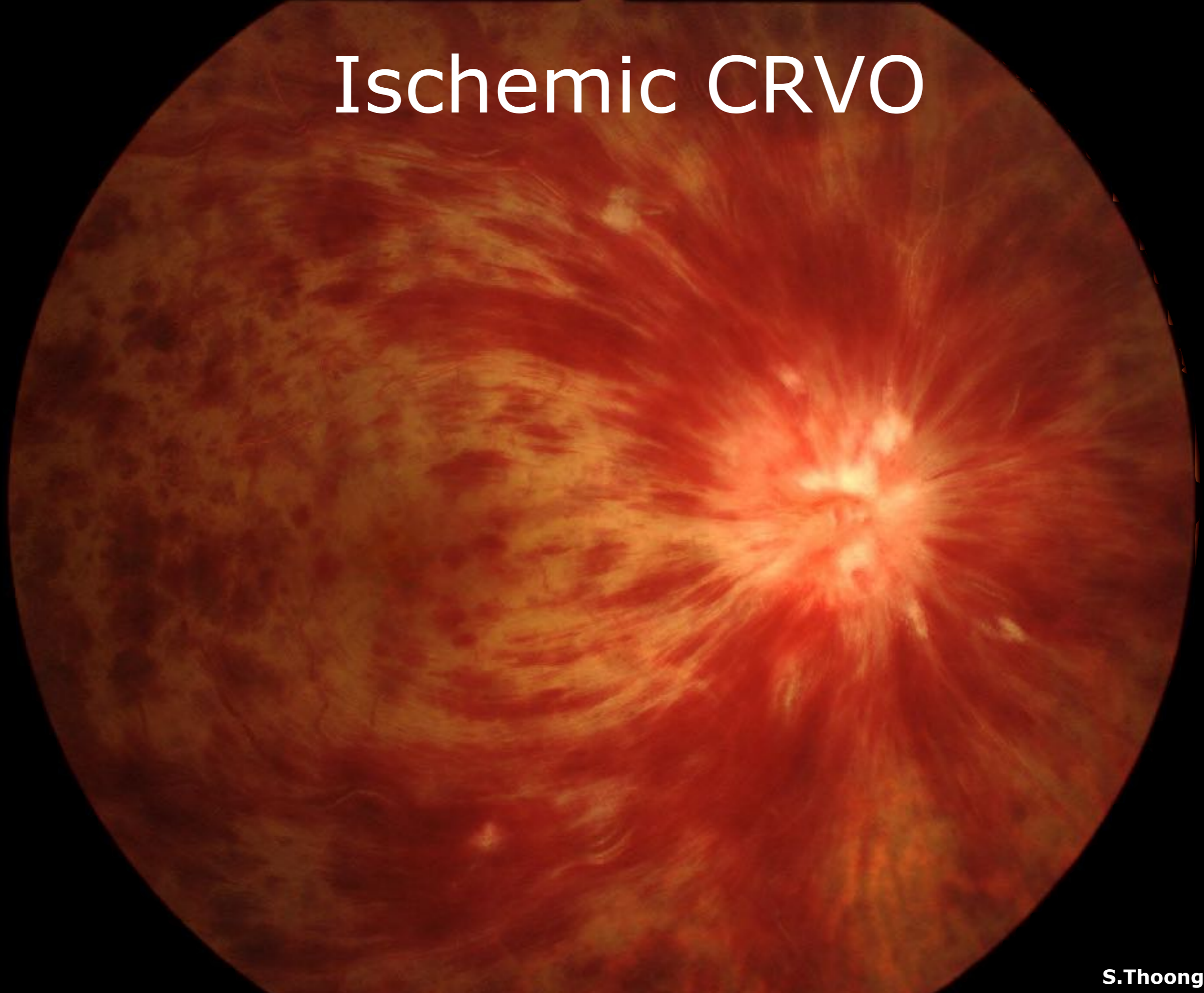
### PATIENTS AT RISK

- HT\*\*\*, DM, DLP, CVD
- Glaucoma
- Retinal vasculitis
- Blood dyscrasia (thrombophilia, leukemia, lymphoma)
- Medications: contraceptives, diuretics

# Non-ischemic CRVO

- Dilated and tortuous of retinal vein
- Flame-shape retinal hemorrhage

# Ischemic CRVO



# R ETINAL V EIN O CCLUSION MANAGEMENT

**\*\*\*All of level 1 evidences are treatment of complications\*\*\***

1. Initiate Rx when macular edema or neovascularization was detected

- Intravitreal injection of anti-VEGFs
  - Intravitreal injection of steroids
  - Laser photocoagulation
- 
- Macular edema
- Neovascularization  
Macular edema from BRVO

2. Systemic evaluation and control risk factors



## HISTORY & CLINICAL ASSESSMENT

- HT, DM, DLP
- CVD
- Medications; contraceptives, diuretics
- Hypercoagulable state & hyperviscosity syndrome

## ROUTINE INVESTIGATIONS

- CBC, BUN, Cr, electrolytes
- FBS, HbA<sub>1</sub>C
- Lipid profiles

## INVESTIGATIONS IN UNCOMMON CASES (age < 50 years, bilateral)

- Homocysteine level
- Protein C, Protein S
- Anti-thrombin III level
- Factor XII
- Activated protein C level
- Prothrombin gene mutation

# RAO & RVO

## IN SUMMARY

- Both RAO and RVO require a careful evaluation of systemic diseases
  - ▶ Older patients: atheromatous and embolic vascular etiologies
  - ▶ Younger patients: autoimmune, hypercoagulable and inflammatory disorders
- Collaboration between *ophthalmologists neurologists and hematologists* in managing RAO and RVO patients is likely to improve outcomes and produce consensus guidelines.

# Thank You

*Faculty of Medicine Siriraj Hospital Mahidol University*