Central Retinal Artery Occlusion (CRAO): Diagnosis and Treatment Options

Marcelo Rocha, MD PhD
Assistant Professor
UPMC Stroke Institute
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• No disclosures
Outline

• Background
  – Epidemiology
  – Vascular anatomy
  – Clinical presentation

• Diagnostic work-up and classification

• Acute treatment options

• Etiological work-up

• Secondary prevention

• Long-term prognosis

• Summary and Conclusions
Epidemiology

- Incidence 1 to 10 in 100,000 patients
- Mean age at presentation 60 – 65 years
- More common in men than women
- Co-morbid with hypertension, diabetes and smoking
- < 10% patients experience significant visual improvement
- Higher risk of subsequent stroke
Etiology

- Carotid artery atherosclerosis
- Cardiogenic embolism
- Small artery disease
- Giant cell arteritis
- Hypercoagulable state
- Rare causes (carotid dissection, orbital pressure during back surgery)
Central Retinal Artery Anatomy

Superior view

- Medial palpebral artery
- Lateral palpebral artery
- Lacrimal gland
- Supraorbital artery
- Zygomatic branches
- Posterior ciliary arteries
- Muscular branch
- Lacrimal artery
- Central retinal artery
- Continuation of ophthalmic artery
- Muscular branch
- Ophthalmic artery
- Internal carotid artery

Netter, 2014
Central Retinal Artery Anatomy

**Figure 3-1** Blood supply to the optic nerve.

Illustrative Case

- 73yoW with h/o HLD, smoking, AAA p/w acute, painless R monocular visual loss
- Home meds include ibuprofen, pravastatin
- BP 175/80, HR 80 (reg), Pox 96%
- R pupil is unreactive and partial blindness OS; Neurological exam was otherwise normal
- Glucose 116, Plts 216 and INR 0.9
Essentials of diagnosis

• Sudden painless monocular vision loss
• Rarely associated with flashing lights
• Most patients can see only hand motions and rarely can count fingers
• Afferent pupillary defect
• Fundoscopic exam showing acute ischemic retinal whitening and macular “cherry red” spot
Fundoscopic exam findings
Acute diagnostic work-up

• CBC, BMP, ESR / CRP and INR / PTT
• Non-contrast CT Head and CTA Head / Neck
• Alternatives to CTA:
  – Carotid duplex US
  – MR angiography
• Cerebral angiogram if severe carotid stenosis
Acute management options

• Conservative therapies
  – Reduction of intra-ocular pressure
  – Vasodilatation
  – Ocular massage

• Off-label reperfusion therapies
  – Intra-arterial thrombolysis
  – IV thrombolysis
Central Retinal Artery Occlusion: Local Intra-arterial Fibrinolysis versus Conservative Treatment, a Multicenter Randomized Trial

Martin Schumacher, MD,¹ Dieter Schmidt, MD,² Bernhard Jurklies, MD,⁵ Chris Isabel Wanke, MD,⁴ Claudia Schmoor, PhD,³ Herbert Mauer-Lenz, PhD,¹ Laszl Harmut Brueckmann, MD,⁷ Aljoscha S. Neubauer, MD,⁸ Armin Wolf, MD,⁸ EAGLE-Study Group*
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Figure Legend:

(A) Percentages of BCVA ≥ 20/200 and (B) clinically significant visual improvement (≥0.3 logMAR) in the IAT and ST groups among all patients with CRAO and those with incomplete, subtotal, and total CRAO.

Ahn et al., 2013
Efficacy of Intravenous Tissue-Type Plasminogen Activator in Central Retinal Artery Occlusion
Report From a Randomized, Controlled Trial

Celia S. Chen, MBBS, PhD, FRANZCO; Andrew W. Lee, MBBS, MPH, FRACP; Bruce Campbell, MBBS, FRACP; Tien Lee, MBBS; Mark Paine, MBBS, FRACP; Clare Fraser, MBBS; John Grigg, MBBS, FRANZCO; Romesh Markus, MBBS, PhD, FRACP

![Graph showing visual acuity over time for different time intervals from presentation: 0-6 hours n=2, 6-12 hours n=1, 12-24 hours n=5.](image-url)
Illustrative case (continued)

- En route to PUH, the Pt becomes dysarthric, w/ left hemiparesis and neglect
- She is transferred directly to the angio suite for MT and R ICA stenting

- She has significant neurological exam improvement without complications but has persistent R visual loss
Etiological work-up

• Vessel imaging
• Exclusion of giant cell arteritis
• Cardiac evaluation
  – Echocardiogram
  – Holter monitoring
• Hypercoagulable testing in select cases
Secondary stroke prevention

- Carotid revascularization
- Atherosclerosis risk factor modification
- Anticoagulation for cardioembolic source or hypercoagulable state
- Steroid treatment in GCA
Clinical course and Long-term prognosis

• Low rate of spontaneous improvement
• Visual acuity at presentation correlates with final visual outcomes
• Late ocular complications (neovascular glaucoma or vitreous hemorrhage)

Kim et al., PLOSone 2019
Summary and Conclusions

• CRAO presents with acute painless monocular vision loss and is a neuro-ophthalmological emergency
• CRAO has a poor prognosis for spontaneous recovery
• Future randomized clinical trials are needed to prove net clinical benefit of thrombolytic therapies in CRAO
• Urgent etiological work-up should be completed for secondary stroke prevention
• Close follow-up for management of late ocular complications and stroke prevention are indicated