Retinal Embolisation after carotid interventions (CEA or CAS): Should it be used as surrogate end-point in asymptomatic carotid trials?

Athanasios D. Giannoukas  MD, MSc(Lond.), PhD(Lond.), FEBVS
Professor of Vascular Surgery
Chairman, Dept. of Vascular Surgery, University Hospital of Larissa
Faculty of Medicine, School of Health Sciences,
University of Thessaly, Greece

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I have no potential conflict of interest to report.

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Retinal embolisation during carotid procedures: a myth or reality

Brain micro-embolisation
CAS is associated on TCD with:
• Particulate macro-embolisation
• Massive air embolisation
• Multiple micro-embolisation
All causing reduction in middle cerebral blood flow
Along with the presence of pre-procedural brain infarcts may predict patients at high-risk of adverse effects

Carotid artery stenting (CAS) has emerged as an alternative therapeutic option to carotid endarterectomy (CEA) for the management of patients with carotid artery stenosis.

Brain micro-embolisation
• Brain micro-embolisation is higher in CAS with distal filter protection devices or flow-reversal as compared to CEA

Ackerstaff R et al. JVS 2005;41:618-24
Gupta N et al. JVS 2011;53:316-22
Tedesco MM et al. JVS 2007;46:244-250
Retinal embolization during CAS is not uncommon, and it occurs in both protected and unprotected procedures (detected by fundoscopy only). Most retinal emboli are clinically silent (visual field testing).

Vos JA et al. CVIR 2010;13:734-9
Several multicentre randomized controlled trials (RCTs) have compared the efficacy of CAS vs. CEA

The outcomes that have been consistently evaluated are transient ischemic attack (TIA), stroke and death and myocardial infarction

Rationale

The effects of Ophthalmic insult after carotid interventions (CAS or CEA) have never been investigated in a systematic manner

In respect to asymptomatic disease in which the difference in the usually investigated outcomes (Stroke, TIA, MI, death) between CAS and CEA may be marginal retinal embolisation may have an impact

Rationale

Visual acuity and visual function are important parameters of the quality of life of elderly patients

Anxiety and depression may often accompany diseases of the eye and conditions associated with visual dysfunction

Thus, eye-related quality of life (temporary or permanent blindness resulting from embolization of atherosclerotic debris into the ophthalmic artery) may be an important denominator in asymptomatic patients undergoing carotid revascularization

Rationale of a Sub-study

Currently ongoing Asymptomatic carotid trials comparing type of treatment (e.g. ACST-2, CREST-2) represent a unique opportunity to investigate and compare the effects of CAS vs. CEA on the ophthalmic circulation and visual function

Numbers needed

- Difficult to make power analysis due to lack of large scale observational studies
- Arguably based on brain embolisation data we assume that equally Retinal embolisation will be a common phenomenon
- Arguably 100 pts in each intervention arm (CEA vs CAS) will suffice
- Re-adjustment after Interim analysis and power calculation will be undertaken when 50 pts will be collected in each arm

Methods

1-3 days prior to intervention
- Visual field testing
- Bilateral Fundoscopy with a digital photography
- Bilateral Fluoroscein angiography (optional)
**Methods**

2-3 days after intervention
- Bilateral Fundoscopy with a digital photography
- Bilateral Fluoroscein angiography (optional)

6 months after intervention
- Visual field testing

**Financial aspects**

Difficult to adapt to all health care systems in Europe

In Greece
- Visual field testing (~20 euros) along with fundoscopy and digital photography = 70 euros
- Fluoroscein angiography = 150 euros (optional)

**Financial aspects**

- 1st assessment = 240 euros
  (without FA = 90 euros)
- 2nd assessment = 220 euros
  (without FA = 70 euros)
- 3rd assessment = 20 euros

**Conclusions**

- Retinal embolisation does occur during carotid interventions
- There is lack of evidence on its impact
- It is easy to be detected and cost-effective
- Unique opportunity to be investigated in the currently ongoing asymptomatic carotid trials

**Thanks for the attention**