**Proximal protection for carotid artery stenting: a preferred solution for ‘all-comers’**

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Disclosure

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I have the following potential conflicts of interest to report:

- Consulting of Medtronic
- Employment in industry
- Stockholder of a healthcare company
- Owner of a healthcare company
- Other(s)

- I do not have any potential conflict of interest
Carotid stenting with proximal protection in ‘all-comers’

Is it feasible, safe and effective?

Proximal Endovascular Occlusion for Carotid Artery Stenting
Results From a Prospective Registry of 1,300 Patients

Microembolization During Carotid Artery Stenting in Patients With High-Risk, Lipid-Rich Plaque
A Randomized Trial of Proximal Versus Distal Cerebral Protection

Evaluation of proximal protection devices during carotid artery stenting as the first choice for embolic protection
Marius Hornung, MD; Stefan C. Bertog, MD; Jennifer Franke, MD; Dani Id, MD; Iris Grunwald, MD; Horst Severt*, MD

Carotid Wallstent Versus Roadsaver Stent and Distal Versus Proximal Protection on Cerebral Microembolization During Carotid Artery Stenting

FEASIBILITY

SAFETY

EFFICACY

yes
Proximal protection in CAS
Penetration of proximal protection in Europe and US

Italy

Rest of Europe

- **Italy**
  - 11% Mo.Ma
  - 89% Distal filter

- **Rest of Europe**
  - 6% Mo.Ma
  - 94% Distal filter

**Proximal Versus Distal Embolic Protection for Carotid Artery Stenting**
A National Cardiovascular Data Registry Analysis

- 10,246 elective CAS. NCDR CARE registry between January 2009 and March 2013 (Mo.Ma/Gore FDA approval 2010)
- **5.8% (590/10,246)**

- Symptomatic lesion status (46.8% vs. 39.7%, p<0.001)
- History of a neurological event (51.2% vs. 46.6%, p=0.03)

**Source**
- EUCOMED DATA 2017
- Giri J. *JACC Intv* 2015;8:609
Proximal protection in CAS

Reluctancy, skepticism, lack of knowledges?

What do people think about proximal protection?

- Blood flow interruption (→ intolerance)
- No angiographic guidance
- Potential ECA/CCA spasm/dissection
- Incomplete exclusion of ECA collaterals
- Contraindicated in CCA+ICA or ECA+ICA lesions
- Difficult to position in complex anatomy
  Bulcky/stiff device, 8-9F in size
Proximal protection in CAS

*No angio guidance*

**Crossing the target lesion**
→ CM injection and take the advantage of stagnation

**Optimal stent deployment**
→ MOMA ECA balloon, bones, theeth, etc
Proximal protection in CAS

*ECA/CCA spasm/dissection*

- Check ECA balloon filling before CAS (avoid air bubble). Don’t overinflate the balloon.
- If ECA dissection develops, leave it alone (rarely flow limiting)
- Check with Doppler US after CAS and at 24 hours
- No change in antiocoagulation protocol
Proximal protection in CAS

Failure to exclude ECA collaterals, STA included

Case #1

Case #2

No spontaneous MES detected by TCD during the whole CAS procedure in both cases

No data available on the risk of microembolization with patent STA

Add a filter to MoMa (optional)
Proximal protection in CAS

Stenosis/occlusion of target vessel ECA

1. Test ECA lesion crossability with the 0.035” Terumo wire, if OK
2. Advance a 4-5F diagnostic catheter, if OK again
3. Exchange Terumo for a stiff wire followed by MO.MA positioning

60/500 (12%) pts with >80% ECA stenosis
Technical success: 100%. Clinical success: 59/60 (98.3%).
Stabile E. Eurointervention 2008
Proximal protection in CAS

ICA+ECA occlusion

- Use the 8F Mo.Ma Ultra mono balloon.
- For better support and navigability, avoid the y-connector or exchange the mandrel for a long 5F catheter (in order to have a longer transition zone).
- Wire reshaping technique
Proximal protection in CAS

*Tandem lesions (ICA+CCA)*

- Check the distance between the 2 lesions. If <60 mm, OK
- Treat the ICA lesion first. Add a filter device at the end of aspiration and complete the procedure
- Pull the Mo.Ma back and treat the second lesion (± CCA balloon inflation)
Proximal protection in CAS

Difficult to position in complex anatomy

A

Standard TRA puncture

B

High TRA puncture

(if pt high >175 cm)

* 8F sheath, brachial, 5.5 cm long, inserted for 1/3 of its length.

8F short sheath
Proximal protection in CAS

Difficult to position in complex anatomy

LICA stenosis with an angulated take-off from the aortic arch. Mo.MA system advancement over .035” stiff wire (SupracoRe)

RICA stenosis with an angulated bifurcation between RSA/RCCA. Mo.MA system advancement over .035” stiff wire (SupracoRe)
Transradial/brachial CAS with proximal protection system

The Monzino’s experience

114 consecutive pts: 74 radial artery and 40 brachial artery

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<th>End-point(s)</th>
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| Crossover to femoral approach             | 3.5% (4/114)* | - Complex anatomy: 2 pts (early LC)  
|                                           |           | - MOMA kinking: 1 pt                                                     |
|                                           |           | - Unexpected RSA occlusion: 1 pt                                         |
| MACCE (per protocol)                      | 1.94% (2/103) | Minor stroke for CCA balloon early deflation: 1 pt                     |
|                                           |           | Minor stroke: 1 pt                                                      |
| Major vascular complication                | 0.87% (1/114) | BA pseudoaneurysm: 1 pt                                                  |
| Radial artery occlusion**                 | 8.0% (6/74)  | All cases occurred in the F/U, asymptomatic                            |

* vs. 6.3% in TRCAS w distal EP; ** by Doppler US at 31days to end of F/U
Proximal protection is a safe and effective tool to limit brain microembolization during CAS, especially in symptomatic pts and high-risk carotid plaques.

Both clinical and surrogate end-points suggest a superiority versus distal filter.

The vast majority of anatomic contraindication/limits to PP (except isolated hemisphere) can be managed with proper endovascular techniques.

A careful pre-CAS assessment of both anatomy (CTA, NMR, DSA) and functionality (Back pressure, Transcranial Doppler) of carotid and collateral circulation is mandatory.

Knowledgeds in cerebral anatomy pathophysiology and expertise in peripheral intervention are fundamental requirements for an optimal use of this device.