What we can learn from our CAS practice?

Maria Antonella Ruffino

Azienda Ospedaliera
Città della Salute e della scienza di Torino
Diagnostic Imaging and Cardiovascular and Thoracic Department
Vascular Radiology
Chairman: dr Claudio Rabbia
Disclosure

Speaker name:
MARIA ANTONELLA RUFFINO

I have the following potential conflicts of interest to report:

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

☒ I do not have any potential conflict of interest
FROM LITERATURE...

CEA and CAS are equally good at preventing stroke in long term.

>30 days ipsilateral stroke

<table>
<thead>
<tr>
<th>STUDY</th>
<th>CEA</th>
<th>CAS</th>
<th>Follow up (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPACE</td>
<td>1.9%</td>
<td>2.2%</td>
<td>2</td>
</tr>
<tr>
<td>CREST</td>
<td>2.4%</td>
<td>2%</td>
<td>median 2.5</td>
</tr>
<tr>
<td>EVA-3S</td>
<td>3.1%</td>
<td>2.4%</td>
<td>median 7.1</td>
</tr>
<tr>
<td>SAPPHIRE</td>
<td>3.6%</td>
<td>3.6%</td>
<td>3</td>
</tr>
<tr>
<td>ICSS</td>
<td>3.4%</td>
<td>4.6%</td>
<td>5</td>
</tr>
</tbody>
</table>
<30 days ipsilateral stroke

Stroke After Carotid Stenting and Endarterectomy in the Carotid Revascularization Endarterectomy Versus Stenting Trial (CREST)

(Circulation. 2012;126:3054-3061.)

![Graph showing # of strokes over different days for CAS and CEA procedures.](image)
PROCEDURE-RELATED STROKE:

- Difficult catheterization of aortic arch

- Disruption of plaque during the carotid catheterization

- Suboptimal embolic protection particularly in complex anatomies
Careful patient selection and evaluation

Adequate planning of CAS, performed by trained endovascular specialists with accurate technique

Optimal embolic protection
48H – 30 DAYS STROKE:

Failure of the stent in complete scaffolding of the plaque
The “ideal” carotid stent:

- Moderate radial force
- High conformability and adaptability
- High grade of scaffolding with small free cell area

Not available on the market yet!!!!

Reduction of delayed stroke: so far, almost impossible...

Decrease of CAS procedure, limited to:
- restenosis
- residual flap
- symptomatic pts. where CEA was risky

(surgically inaccessible carotid lesions, scarred or infected necks, recurrent laryngeal nerve injury or controlateral ICA occlusion, etc.)
SINGLE CENTER PRELIMINARY EXPERIENCE
6 cases (1 female, age range 67-81)

Duplex scan before procedure, at 1, 3, 6 and 12 months after CAS
DW-MRI before the procedure, at 24-48 hours and 1 month after CAS

All patients underwent DAPT before the procedure and for one month after CAS, then ASA 100 mg/die longlife

Carotid stent size and filter protection device were chosen according to US evaluation of CCA and ICA

One symptomatic patient, three cases of restenosis

<table>
<thead>
<tr>
<th>Name</th>
<th>Sex, age</th>
<th>Sympt.</th>
<th>Side, % stenosis</th>
<th>Primary stenosis, restenosis</th>
<th>Plaque characteristics</th>
<th>length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pt. 01</td>
<td>M, 79 y</td>
<td>no</td>
<td>left, 75%</td>
<td>restenosis</td>
<td>hyperechogenic</td>
<td>15 mm</td>
</tr>
<tr>
<td>Pt. 02</td>
<td>F, 81 y</td>
<td>no</td>
<td>Left, 75%</td>
<td>restenosis</td>
<td>mixed echogenicity</td>
<td>15 mm</td>
</tr>
<tr>
<td>Pt. 03</td>
<td>M, 70 y</td>
<td>no</td>
<td>Left, 80%</td>
<td>primary</td>
<td>mixed echogenicity</td>
<td>15 mm</td>
</tr>
<tr>
<td>Pt. 04</td>
<td>M, 75 y</td>
<td>no</td>
<td>Right, 75%</td>
<td>primary</td>
<td>calcified</td>
<td>15 mm</td>
</tr>
<tr>
<td>Pt. 05</td>
<td>M, 67 y</td>
<td>yes</td>
<td>Right, 80%</td>
<td>primary</td>
<td>hypoechogenic</td>
<td>20 mm</td>
</tr>
<tr>
<td>Pt. 06</td>
<td>M, 72 y</td>
<td>no</td>
<td>Left, 75%</td>
<td>restenosis</td>
<td>hyperechogenic</td>
<td>15 mm</td>
</tr>
<tr>
<td>Name</td>
<td>Access</td>
<td>Guiding cath</td>
<td>Protection system</td>
<td>Stent</td>
<td>Post-dilation</td>
<td>24-48 h events at DW MRI</td>
</tr>
<tr>
<td>------</td>
<td>--------------</td>
<td>-------------------</td>
<td>-------------------------</td>
<td>--------</td>
<td>---------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Pt. 01</td>
<td>fem</td>
<td>Flexor Shuttle 6F 90 cm, Cook</td>
<td>Filterwire EZ, Boston Scientific</td>
<td>9x20</td>
<td>yes</td>
<td>none</td>
</tr>
<tr>
<td>Pt. 02</td>
<td>fem right brachial</td>
<td>Flexor Shuttle 6F 90 cm, Cook</td>
<td>Filterwire EZ, Boston Scientific</td>
<td>7x25</td>
<td>yes</td>
<td>3 ipsilateral 2 controlateral</td>
</tr>
<tr>
<td>Pt. 03</td>
<td>fem</td>
<td>Flexor Shuttle 6F 90 cm, Cook</td>
<td>EmboshieldAb bott Vascular</td>
<td>10x20</td>
<td>yes</td>
<td>none</td>
</tr>
<tr>
<td>Pt. 04</td>
<td>fem</td>
<td>Flexor Shuttle 6F 90 cm, Cook</td>
<td>Filterwire EZ, Boston Scientific</td>
<td>9x20</td>
<td>yes</td>
<td>none</td>
</tr>
<tr>
<td>Pt. 05</td>
<td>fem</td>
<td>Flexor Shuttle 6F 90 cm, Cook</td>
<td>EmboshieldAb bott Vascular</td>
<td>7x30</td>
<td>yes</td>
<td>none</td>
</tr>
<tr>
<td>Pt. 06</td>
<td>fem</td>
<td>Flexor Shuttle 6F 90 cm, Cook</td>
<td>Filterwire EZ, Boston Scientific</td>
<td>9x20</td>
<td>yes</td>
<td>none</td>
</tr>
</tbody>
</table>

NOW COLLECTING 3 MONTHS DATA
CASE 1: G.E., male, 70 y.o.

Smoker
Hypertension

October 2014: Duplex US left ICA stenosis 80% (ECST) and right ICA stenosis 75% (ECST)

10.28.2014: DW MRI with no evidence of recent ischemic lesions

Therapy: Clopidogrel 75 mg 1 co
ASA 100 mg 1 co
Atenolol (Seles B) 100 mg 1 co
Ramipril (Triatec) 2.5 mg 1 co
Amlopidine (Norvasc) 5 mg 1 co
Atorvastatin (Torvast) 40 mg 1 co
Right femoral access: Flexor Tuohy-Borst Side-Arm Introducer Shuttle Select 6 F 90 cm, Cook

Emboshield NAV 6
Embolic Protection System, Abbott Vascular
OCT after stenting

OCT St. Jude Medical
Illumien System
10.30.2014 MR DWI HR @24 H

Duplex scan @24 H
CASE 2: G.C., female, 81 y.o.

Hypertension
PAOD (bilateral sural claudication 100 mt.)

March 2014: EA left ICA

October 2014: Duplex US, left ICA restenosis 75% (ECST) and right ICA stenosis 65% (ECST)

Therapy: Clopidogrel 75 mg 1 co
          ASA 100 mg 1 co
          Cilostazol (Pletal) 100 mg 1 co
          Atenolol 100 mg 1 co
10.19.2014: DW MRI
10.20.2014: CAS

Right femoral access: Flexor Tuohy-Borst Side-Arm
Introducer Shuttle Select 6 F 90 cm

SIM2 5F 125 cm, shaped in aortic biforcati
Terumo J guidewire in ECA
Attempt to deliver the Shuttle in CCA with coaxial technique
Right axillary artery access:
Flexor Tuohy-Borst Side-Arm Introducer
Ansel Modification 6 F 55 cm, Cook
Right axillary artery access:
Flexor Tuohy-Borst Side-Arm Introducer
Ansel Modification 6 F 55 cm, Cook

FilterWire EZ,
Boston Scientific
After pre dilation at 3 mm
OCT after stenting

OCT St. Jude Medical Ilumien System
Post procedure Duplex scan
10.21.2014: DW MRI @24 H

NO SYMPTOMS!
Duplex scan @1 mo.
DW MRI @1 month
Accurate CAS technique is mandatory for reducing the risks related to catheterization of the arch, plaque disruption and consequent procedure related embolic events.

Roadsaver carotid stent seems promising in term of reduction of delayed embolic events and DW MRI ischemic lesions after CAS compared to conventional stent, but...

...long follow up trials from skilled endovascular specialists working in high volume centers are needed in order to evaluate durability of the device, fate of ICA and ECA, and long term clinical benefit.
What we can learn from our CAS practice?

Maria Antonella Ruffino

Azienda Ospedaliera
Città della Salute e della scienza di Torino
Diagnostic Imaging and Cardiovascular and Thoracic Department
Vascular Radiology
Chairman: dr Claudio Rabbia