CAS with proximal protection from tranradial/brachial approach

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Disclosure

Speaker name: MONTORSI PIERO

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
CAS through TR/TB approach

CAS throught unconventional vascular approach has been proved to be safe and effective, especially in ...

However, due to the small radial size a limited CAS equipment is currently used, excluding proximal protection.
Unconventional Access during CAS

*The Monzino’s experience*

CAS procedures/year (n)

- Distal protection (N=121)
- Proximal protection (N=50)

TR/TBA 171/793 (21.5%)
## Patient characteristics (n=50)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>n</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (year), ≥75</td>
<td>74±7, 22</td>
<td>44%</td>
</tr>
<tr>
<td>Sex (male)</td>
<td>47</td>
<td>94%</td>
</tr>
<tr>
<td>Asymptomatic</td>
<td>48</td>
<td>96%</td>
</tr>
<tr>
<td>CAD</td>
<td>25</td>
<td>50%</td>
</tr>
<tr>
<td>Diabetes</td>
<td>15</td>
<td>30%</td>
</tr>
<tr>
<td>PAD</td>
<td>12</td>
<td>24%</td>
</tr>
<tr>
<td>COLD</td>
<td>7</td>
<td>14%</td>
</tr>
<tr>
<td>Hypertension</td>
<td>36</td>
<td>72%</td>
</tr>
<tr>
<td>Smoking</td>
<td>25</td>
<td>50%</td>
</tr>
<tr>
<td>Previous CEA/CAS</td>
<td>11</td>
<td>22%</td>
</tr>
<tr>
<td>High-surgical risk</td>
<td>25</td>
<td>50%</td>
</tr>
<tr>
<td>Doppler PSV (m/s)/DS%</td>
<td>3.6±0.9/83±8</td>
<td></td>
</tr>
<tr>
<td>CTA MLA (mm²)/DS%</td>
<td>3.5±1.8/89±5</td>
<td></td>
</tr>
</tbody>
</table>

CTA MLA= CT-angiography minimal lumen area
TRA/TBA with proximal protection

- **Indication for CAS (CT-angiography)**
  - BAAC (N=26)
  - PAD/Aortic arch disease/Plongeant IA (N=7)
  - Learning Curve (N=17)
  - *soft plaque (Doppler US/CT-angio criteria)*

- **Vascular access (at operator’s discretion)**
  - Trans-radial (n=26) → Heparin iv → TR-band
  - Trans-brachial (n=24) → Bivalirudin iv → Manual compression

- **Carotid stenosis side**
  - LICA (N=30)
  - RICA (N=20)
TRA/TBA with proximal protection

8F Mo.Ma Ultra

8F Mo.Ma Ultra mono

+ 5F compatible stent (CW 7, Precise 8, Cristallo Ideale 6-7)

n=47

n=3
CAS with proximal protection from TR/TBA

Study protocol

CAS with TRA/TBA (n=171 pts)

- BAAC + LICA; Type II-III aortic arch + RICA; Diseased aortic arch/PAD +RICA/LICA; «Plongeant» IA+ RICA (n=103)
- TBA (n=51)
  - Distal protection attempted n=27
    - Crossover to FA (n=1) → n=26
  - Proximal protection attempted n=24
    - Crossover to FA (n=1) → n=23

- TRA (n=120)
  - Distal protection attempted n=94
    - Crossover to FA (n=9) → n=85
    - Crossover to Filter (n=4) → n=22
  - Proximal protection attempted n=26
    - Crossover to FA (n=1) → n=26

All comers Learning curve (n=70)
CAS from the right radial/brachial access

**Procedural Steps**

1. Terumo wire in target vessel
   - Right ICA: 5FRJ/LM
   - Left ICA: 5F Simmons-1

2. Diagnostic cath in ECA
   - Terumo exchanged for a stiff wire

Filter

Mo.Ma
TRA/TBA with proximal protection

Bovine aortic arch + LICA stenosis

Carotid Artery Stenting in Patients With Left ICA Stenosis and Bovine Aortic Arch: A Single-Center Experience in 60 Consecutive Patients Treated Via the Right Radial or Brachial Approach

Dec 2014: 77 pts, 26 Mo.Ma (34%)

Montorsi P. et al
- J EVT 2014;21:127
CAS w proximal protection through TRA/TBA

*Bovine aortic arch + LICA stenosis*

Type 2 bovine aortic arch + LICA stenosis. CT-angio (LAO 45° view)

5F diag RJ in LCCA through right brachial artery

8F MO.MA system ECA+CCA balloons occlusion (arrows)

Final result CW (7x30), post-dilated with a 5.5x20mm
CAS w proximal protection through TRA/TBA

Critical issues

IA/LCCA bifurcation
BAAC

IA/LCCA bifurcation

RSA/RCCA bifurcation

22%
**CAS w proximal protection through TRA/TBA**

**Issue:** System stiffness + single wire support + lack of inferior anatomic support → prolapse into IA/aortic arch

**Solving:** Mandrel removal (partial/total) + additional wire
**No Mandrel, two wires technique**

*The NO.MA technique*

- 0.035” Emerald wire loaded into the working channel *(mandrel withdrawn)*
- 0.035” stiff wire loaded into the distal port
### NO.MA technique: Patient population

<table>
<thead>
<tr>
<th>No</th>
<th>Age yrs</th>
<th>Target ICA</th>
<th>MO.MA</th>
<th>Wires</th>
<th>Vascular approach</th>
<th>AC</th>
<th>TS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>80</td>
<td>Left</td>
<td>Ultra</td>
<td>Stiff+Emerald</td>
<td>Right Brachial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>74</td>
<td>Right</td>
<td>Ultra</td>
<td>Stiff+Emerald</td>
<td>Right Radial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>66</td>
<td>Right</td>
<td>Ultra</td>
<td>Emerald + V18</td>
<td>Right radial</td>
<td></td>
<td></td>
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<tr>
<td>4</td>
<td>67</td>
<td>Right</td>
<td>Ultra Mono</td>
<td>Emerald x 2</td>
<td>Right Brachial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>64</td>
<td>Left</td>
<td>Ultra Mono</td>
<td>Emerald x 2</td>
<td>Right Radial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>71</td>
<td>Right</td>
<td>Ultra</td>
<td>Stiff+Emerald</td>
<td>Right Radial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>70</td>
<td>Right</td>
<td>Ultra</td>
<td>Emerald x 2</td>
<td>Right Radial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>73</td>
<td>Right</td>
<td>Ultra</td>
<td>Emerald + partial mandrel withdrawal</td>
<td>Right Brachial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>73</td>
<td>Right</td>
<td>Ultra</td>
<td>Stiff+Terumo</td>
<td>Right Brachial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>71</td>
<td>Right</td>
<td>Ultra</td>
<td>Stiff+Emerald</td>
<td>Right Brachial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>77</td>
<td>Left</td>
<td>Ultra</td>
<td>Stiff+Emerald</td>
<td>Femoral</td>
<td>Hepa</td>
<td>yes</td>
</tr>
<tr>
<td>12</td>
<td>60</td>
<td>Right</td>
<td>Ultra Mono</td>
<td>Stiff+Emerald</td>
<td>Right Radial</td>
<td>Hepa</td>
<td>yes</td>
</tr>
</tbody>
</table>

r= right, F= femoral, B= Brachial, R= radial, TS= technical success, AC= anticoagulant
CAS w proximal protection through TRA/TBA

*Issues with RSA-RCCA bifurcation*

Supracore .035"

Mandrel partial withdrawal
CAS w proximal protection through TRA/TBA

*Issues with RSA-RCCA bifurcation*

Type I aortic arch. Right ICA near-occlusion

5FRJ cath in RCCA from right radial approach

5FRJ cath in ECA (over the Terumo wire)

Terumo exchanged for stiff wire. 5FRJ removed. MO.MA system did not get across the bend
Sharp angle of RSA-RCCA bifurcation

*Mo.Ma placement with modified technique*

Additional 0.035” Emerald wire below bifurcation through 6FRJ guide
Sharp angle of RSA-RCCA bifurcation

Mo.Ma placement with modified technique

Additional 0.035” Emerald wire below bifurcation through 6FRJ guide

Both MO.MA balloon inflated

Final result after Cristallo stent
CAS with proximal protection from TR/TBA

*RICA stenosis: No.Ma Technique*
CAS with proximal protection from TR/TBA

**LICA stenosis: aortic arch thrombosis**

MR. 80 y-o-m. Left hemispheric stroke 3 months before
Deemed at too high-surgical risk for CEA for co-morbidities (CAD, COLD type IV)

Left ICA PSV: >4m/s
CAS with proximal protection from TR/TBA
LICA stenosis with aortic arch atherosclerosis (FA contraindicated)

Coaxial system: 6FRJ guide+4FMP 125, loaded on Terumo wire from R brachial approach
6FRJ guide in ECA. 4FMP removed
Terumo wire exchanged for .035” standard wire + .035”stiff wire (Magic Torque, BSI).
8F MO.MA loaded on the 2 wires (No.Ma technique)
8F MO.MA in place
Final result
CAS with proximal protection from TR/TBA

Technical issues with the Mo.Ma mono balloon
CAS with proximal protection from TR/TBA

*LICA stenosis: No.Ma Technique (Mo.Ma mono balloon)*

- Type I aortic arch
- 5F Tiger cath into LCCA from right radial approach
- 0.035” Emerald wire below bifurcation. Tiger exchanged for 4FMP+6FRJ
- 6F RJ guide into LCCA over 4FMP
- Additional 0.035” Emerald wire below bifurcation. 8F Mo.Ma mono in place.
CAS with proximal protection from TR/TBA

LICA stenosis: No.Ma Technique (Mo.Ma mono balloon)

Early frame

Mid frame

Late frame

Spider 6.0mm

CW 7x30 Post-dil 5.5x20

Final result

Test for occlusion
CAS with proximal protection from TR/TBA

**Crossover & Technical Success**

- **TBA w Mo.Ma → TFA w Mo.Ma**
  - 1 pt: sharp angle of RSA/RCCA bifurcation. CAS+Mo.Ma carried out successfully from the FA

- **TRA w Mo.Ma → TRA w Filter**
  - 1 pt: Mo.Ma too short to enter the ECA

- **TRA w Mo.Ma → TRA w Filter**
  - 3 pts: early intolerance to clamping with prompt symptom resolution by declamping. CAS+filter carried out successfully. *Lesion crossing with filter under proximal protection*

5/50 patients

**Technical failure (4%)**

**Intolerance (6%)**
**CAS with proximal protection from TR/TBA**

**MACCEs & Vascular complication rate**

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Cases</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TRA/TBA with filter</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRA/TBA</td>
<td>2/121</td>
<td>1.65%</td>
</tr>
<tr>
<td>1 left minor stroke</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 left retinal embolism</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TRA/TBA with Mo.Ma</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRA/TBA</td>
<td>0/50</td>
<td>0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Cases</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TRA/TBA with filter</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRA/TBA</td>
<td>4/121</td>
<td>3.3%</td>
</tr>
<tr>
<td>2 BA pseudo-aneurism</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 BA thrombosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 RAO</td>
<td></td>
<td>6.6%</td>
</tr>
<tr>
<td><strong>TRA/TBA with Mo.Ma</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRA/TBA</td>
<td>0/50</td>
<td>0%</td>
</tr>
<tr>
<td>2/26 RAO</td>
<td></td>
<td>7.6%</td>
</tr>
</tbody>
</table>

**In-hospital & 30 days MACCE (S/D/MI)**

**Major Vascular Complications**

* RA patency assessed by Doppler US at an average FU of 224±224 days
<table>
<thead>
<tr>
<th>Procedure Variable</th>
<th>TF CAS w Mo.MA (n=128)</th>
<th>TR/B CAS w Mo.Ma (n=45)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedural time (s)</td>
<td>943±311</td>
<td>923±229</td>
</tr>
<tr>
<td>Fluoroscopy time (s)</td>
<td>706±286</td>
<td>790±373</td>
</tr>
<tr>
<td>DAPT</td>
<td>7450±3597</td>
<td>6837±2863</td>
</tr>
<tr>
<td>Contrast medium (ml)</td>
<td>113±33</td>
<td>101±28</td>
</tr>
</tbody>
</table>
Take home messages

- CAS from unconventional vascular approach, mainly the transradial/brachial, is a safe and effective endovascular strategy

- It is the right way to go in selected vascular settings, including bovine aortic arch, peripheral arterial disease and aortic arch atherosclerosis

- All the standard CAS equipment can be used, included the proximal protection, either from the radial or brachial approach

- Learning curve and sound CAS experience required
CAS with proximal protection from tranradial/brachial approach

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