Minimal Invasive Segmental Artery Coil Embolization (MISACE) For Prevention Of Spinal Cord Ischemia During EVAR Of Thoracoabdominal Aortic Pathologies: Initial Clinical Results

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NO DISCLOSURES RELATED TO THE PRESENTED TOPIC


Ischemic Spinal Cord Injury

OR: 14% ER: 10%
OR: 22% ER: 19%
OR: 10% ER: 5%
OR: 3% ER: 2%

Conventional perioperative neuroprotective strategies

- Blood pressure Management
- Continuous CSF drainage
- Staged Aortic Repair
- Staged endovascular repair
- Temporary Aneurysm Sac Perfusion (TASP)

Pragmatic Approach for SCI

Revascularize as many inflow arteries as possible (subclavian, hypogastric)

Optimizing hemodynamic management

Strategies that induce development of collateral arteries = Ischemic Preconditioning of the spinal cord

Ischemic Preconditioning of the Spinal Cord

- Based on the Collateral Network Concept of Spinal Cord Perfusion
- The hypothesis of a spinal blood supply depending mainly on one critical arterial input (Adamkiewicz Artery) is obsolete.
Ischemic Preconditioning of the Spinal Cord

- Concept: occlusion of the main stem of several SAs preserving the capability of the paraspinous collateral network to build new arteries
- Technique: Minimal Invasive SA Staged Occlusion (MISACE)^1,2
- Utility: an entirely endovascular first stage of a "staged approach" for TAAA repair to reduce ischemic spinal cord injury

MISACE - Procedure

- local anesthesia
- percutaneous trans-femoral access with a 5Fr Sheath
- no CSF drainage
- clinical monitoring of the patients' neurologic function for at least 48h after the procedure

MISACE - Leipzig Experience

MISACE - Leipzig Experience September 2014 – December 2017

<table>
<thead>
<tr>
<th>Demographics</th>
<th>N (%)</th>
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<tbody>
<tr>
<td>Sex</td>
<td>Male 43 (75)</td>
</tr>
<tr>
<td>Age Mean ± SD (years)</td>
<td>68.6 ±7.9</td>
</tr>
<tr>
<td>Cardiovascular Risk Factors</td>
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<tr>
<td>Hypertension</td>
<td>67 (100)</td>
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<tr>
<td>Chronic pulmonary disease</td>
<td>19 (35)</td>
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<tr>
<td>Coronal artery disease</td>
<td>22 (40)</td>
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<tr>
<td>Diabetes mellitus</td>
<td>27 (47)</td>
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<tr>
<td>GFR Mean±SD (mL/min/1.73m²)</td>
<td>68.9 ±19.3</td>
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<tr>
<td>Renal Insufficiency</td>
<td></td>
</tr>
<tr>
<td>GFR &lt;60 mL/min/1.73m²</td>
<td>20 (35)</td>
</tr>
<tr>
<td>BMI</td>
<td>Mean ± SD 27.7 ±5.1</td>
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TAAA (n=57)

Aneurysm Characteristics

<table>
<thead>
<tr>
<th>N (%)</th>
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<tr>
<td>Type II</td>
</tr>
<tr>
<td>Type III</td>
</tr>
<tr>
<td>Type IV</td>
</tr>
<tr>
<td>Maximal Diameter (mm)</td>
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<tr>
<td>Previous Repair of the Aorta</td>
</tr>
<tr>
<td>Thoracic aorta open repair</td>
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<tr>
<td>Thoracic aorta open repair+ ER</td>
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<tr>
<td>Abdominal aorta open repair</td>
</tr>
<tr>
<td>Abdominal aorta endovascular</td>
</tr>
<tr>
<td>Endovascular Dissection</td>
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Patent SAs at the Aortic Level Planned for Endovascular Repair

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<tr>
<th>SAs in the Aortic Area planned to be stented</th>
<th>Mean ± SD</th>
<th>Median (Range)</th>
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</thead>
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MISACE Sessions

- TAAA (n=57)
  - 1. MISACE (Stage 1) (n=22) 38.6%
  - 2. MISACE (Stage 2) (n=24) 42.1%
  - 3. MISACE (Stage 3) (n=11) 19.3%
Minimally Invasive Occluded SAs

Characteristics of the sessions of minimally invasive segmental artery coil embolisation

No spinal cord ischemia!

Minor complications  N  %
Backpain  13  22.8
Loss of Coils  2  3.5
Unable to occlude one SA  3  5.3

Complete Aneurysm Exclusion after MISACE

Complete Aneurysm Exclusion after MISACE

Variables  No.  Mean ± SD  %
General Anaesthesia  54  
Duration of Procedure(min)  175 ± 50.7
Fluoroscopy Time(min)  60.5 ± 22.4
TEVAR  31  54.4
BEVAR  14  24.5
FBEVAR  5  8.7
CSFD  1  1.7
Subclavian Coverage  1  1.7
Hypogastric Patency  46  80.7
Length of Covered Aorta(mm)  270±86.3

MISACE waiting for CMD due to global heart failure

Branzan D et al. Eurointervention 2018
30 Days Results

- TAAA (n=57)
- MISACE (Stage 1) (n=22) Optional
- MISACE (Stage 2) (n=24) Optional
- MISACE (Stage 3) (n=11) Endovascular Repair of TAAA (Stage 4) (n=55)
- No SCI
- 1 Death

Conclusion

- First experience suggest that MISACE is feasible, safe and effective.
- Segmental artery coiling in thoracoabdominal aneurysms can be challenging, a new field with many open questions.
- The ultimate proof of MISACE’s success requires a randomized trial which is currently underway: ‘Paraplegia Prevention in Aortic Aneurysm Repair by Thoracoabdominal Staging with Minimally-Invasive Segmental Artery Coil-Embolization (MISACE)’ : A Randomized Controlled Multicenter Trial (PAPA_ARTiS).

Thank you!

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