Extended Aortic Repair in Acute Type I AD

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Acute Type I Aortic Dissection (AD)

Life threatening disease

Surgical Challenge

Tamponade

Aortic root valve involvement

Arch involvement

Malperfusion

Prognosis of residual dissection

Median sternotomy
Proximal ao. repair
The Problem of Malperfusion

Visceral Malperfusion = The major Killer of malperfusion sides

Extended Aortic Repair
Why – When - How

<table>
<thead>
<tr>
<th>Why</th>
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<tbody>
<tr>
<td></td>
<td>• stabilize the true lumen downstream</td>
</tr>
<tr>
<td></td>
<td>• resolve malperfusion</td>
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<tr>
<td></td>
<td>• initiate positive aortic remodeling downstream</td>
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<table>
<thead>
<tr>
<th>When</th>
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<tbody>
<tr>
<td></td>
<td>• TL collapse / distal malperfusion</td>
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<tr>
<td></td>
<td>• Re-entry in descending aorta</td>
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<tr>
<td></td>
<td>• Surgeons decision based on patient’s clinical status and</td>
</tr>
<tr>
<td></td>
<td>comorbidities</td>
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<table>
<thead>
<tr>
<th>How</th>
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<tbody>
<tr>
<td></td>
<td>• Frozen elephant trunk</td>
</tr>
<tr>
<td></td>
<td>• Endovascular treatment</td>
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</tbody>
</table>
Frozen Elephant Trunk - Ao. Remodeling

Remodeling (1y) based on volume changes

Aortic Levels

- SG
- SG-TC
- TC-distal

[Bar chart showing percentage changes]
**Zone 2 Concept**

**Technique to Facilitate FET**

**LSA Debranching**

4 techniques

**8-12mm Graft**

Tsagakis et al, Ann Cardiothorac Surg. 2013

**Advantages**

- Easier distal anastomosis
- Selective LSA perfusion
  (= total arch vessels perfusion)
- No risk for laryngeal nerve injury
Distal Selective Perfusion
Whole body selective perfusion during arch replacement

Tsagakis et al, MITAT 2015

- Distal anastomosis
  - SACP 22°C (blood), 50-60 mmHg [steroids]

- Venous line
- Vent / Field / Sump
- Right axillary artery
- Left axillary artery
- LCCA
dec. Aorta

- Cooling 28°C (bladder)

- Separate circuit for selective perfusion of
  - Left subclavian/axillary artery
  - Downstream aorta

- Add. reservoir
- venous reservoir
- centrifugal pump
- extra pump

Head vessels reimplantation
Selective whole body perfusion 28°C
Zone 2 Arch Repair + Selective Distal Perfusion

Times Reduction

Current perfusion management - Results

<table>
<thead>
<tr>
<th>Median, min</th>
<th>SACP + LSA + SDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPB</td>
<td>224</td>
</tr>
<tr>
<td>Cardiac arrest</td>
<td>126</td>
</tr>
<tr>
<td>SACP</td>
<td>54</td>
</tr>
<tr>
<td>Visceral ischemia</td>
<td>31</td>
</tr>
</tbody>
</table>

SDP = Selective Distal Perfusion
Endovascular TL Stabilization

TL-Expansion by uncovered Stents to restore visceral and distal perfusion

Specific visceral-peripheral malperfusion treatment prior or direct after proximal aortic repair

Tsagakis et al
To be published
Essen Hybrid Concept in Acute Type I AD

**Equipment**
- RR Monitoring (3 peripheral arteries)
- TEE
- NIRS
- Cell saver
- Thromboelastometry
- C-arm flour mounted
- Angioscopy
- Heart lung machine (2 arterial circuits)

Endo + Surg. on the same table – no patient transport

Tsagakis et al, EJCTS 2012
Uncovered Stents Implantation

Retrograde implantation

Antegrade implantation
Fate of Aorta after Uncovered Stenting

N = 19 patients 2008-2018
FU mean 2.8 years

- No occlusion of visceral arteries
- No nitinol fracture
- Diameter abdominal aorta
  *Enlargement* $(p=0.027)$
  $0.8 \text{ mm} / \text{ year}$
- Area ratio TL/AL, %
  *Stable* $(p=0.280)$

No significant FL progress
Compatibility of uncovered Stent
Case Example

55 y/o, male
6 years after TL stabilization by 3 E-XL stents and ascending aorta replacement for Type I AD and Penn BC clinical status

Re-OP for Pseudoaneurysm at distal anastomosis
Compatibility of uncovered Stent Case Example

Angioscopy downstream

Endothelialization – Neo Intima throughout the stented ao. segments
Results
FET in Acute Type I AD

Preop. Data | N = 150
---|---
Age (mean±SD) | 57 ± 11
Male, % | 72
Penn A, %
No circulatory collapse + No malperfusion | 32
Penn B, %
Malperfusion | 45
Penn C, %
Circulatory collapse | 9
Penn BC, %
Circulatory collapse + Malperfusion | 17

Postoperative Results | N = 150
---|---
Mortality 30d, % | 11
Stroke, % | 7
Paraplegia, % | 1

Residual dissection
- 3%
- 75%
- 83%
Long Term Results
FET in Acute Type I AD

Survival 8 yrs 58%

Freedom from distal reintervention 8 yrs 81%
endovascular intervention N = 6
open surgery N = 6
FET – Extension by Safi-Estrera
Aortic Live Symposium 2014, Essen
## Results

**Thoracoabdominal Stenting**

### Preop. Data

<table>
<thead>
<tr>
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<th>N = 19</th>
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<tbody>
<tr>
<td><strong>Age (mean±SD)</strong></td>
<td>56±11</td>
</tr>
<tr>
<td><strong>Male, %</strong></td>
<td>84</td>
</tr>
<tr>
<td><strong>Penn A, %</strong></td>
<td>0</td>
</tr>
<tr>
<td>No circulatory collapse + No malperfusion</td>
<td></td>
</tr>
<tr>
<td><strong>Penn B, %</strong></td>
<td>58</td>
</tr>
<tr>
<td>Malperfusion</td>
<td></td>
</tr>
<tr>
<td><strong>Penn C, %</strong></td>
<td>0</td>
</tr>
<tr>
<td>Circulatory collapse</td>
<td></td>
</tr>
<tr>
<td><strong>Penn BC, %</strong></td>
<td>42</td>
</tr>
<tr>
<td>Circulatory collapse + Malperfusion</td>
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</tbody>
</table>

### Postoperative Results

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<tr>
<td>Mortality 30d, %</td>
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<tr>
<td>Stroke, %</td>
<td>0</td>
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<tr>
<td>Paraplegia, %</td>
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**Survival 4 yrs 66%**

![Survival graph](image)
Summary 1

Extended aortic repair by FET

• enables TL stabilization + FL exclusion + positive remodeling downstream without increasing mortality

• provides a safe docking zone for endo/open aortic re-intervention distally
Summary 2

Extended aortic repair by thoracoabdominal stenting (uncovered stents)

• enables abolishment of malperfusion
• enables durable TL stabilization
• may provide (due to endothelialization)

Safe landing zone for TEVAR

Endovascular Reentry occlusion e.g. occluder / stenting
In 2018 the Aortic Live Symposium will return to Essen, Germany. We are looking forward to welcoming you again this fall! Get a taste of what awaits you:

www.aortic-live.com