Will we still need open surgery for acute aortic dissections in 2025? – a cardiovascular surgeon’s perspective

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Overview

- **Anatomy acute aortic dissection**
- **Current treatments**
  - open surgical
  - endovascular
  - hybrid
- **New options**
  - valve-containing stentgraft
Acute aortic dissection

- Type A
- Type B
- Non-A / Non-B
Type B aortic dissection is already treated using endovascular techniques exclusively.
Intraoperative View
Fundamental principle in acute type A aortic dissection

- Complicated: Presence of Malperfusion
  - Adapt Surgical Strategy to Organ System(s) Affected by Malperfusion
  - Proceed with Classical Surgical Repair Adding Individual Malperfusion-Resolving Strategy

- Uncomplicated: Absence of Malperfusion
  - Proceed with Classical Surgical Repair
**TABLE 2** Survival per Number of Pre-Operative Malperfused Organ Systems

<table>
<thead>
<tr>
<th>Malperfused Organ Systems</th>
<th>Total</th>
<th>Survivors</th>
<th>Dead</th>
<th>Percent Dead per Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>1,420 (66.4)</td>
<td>1,241 (58.1)</td>
<td>179 (8.4)</td>
<td>12.6</td>
</tr>
<tr>
<td>1</td>
<td>494 (23.1)</td>
<td>389 (18.2)</td>
<td>105 (4.9)</td>
<td>21.3</td>
</tr>
<tr>
<td>2</td>
<td>139 (6.5)</td>
<td>96 (4.5)</td>
<td>43 (2.0)</td>
<td>30.9</td>
</tr>
<tr>
<td>3</td>
<td>53 (2.5)</td>
<td>30 (1.7)</td>
<td>23 (1.1)</td>
<td>43.4</td>
</tr>
</tbody>
</table>

Values are n (%).
Open surgical method: frozen elephant trunk implantation
Hybrid technique

Zone 2 Arch
Acute non-A non-B aortic dissection: incidence, treatment and outcome

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Double branched main body
What is innovation?

The task is, not so much to see what no one has yet seen; but to think what nobody has yet thought, about that which everybody sees.

ERWIN SCHRODINGER
Physicist & Philosopher
Endo-conduit
Integrated concept

1 – Distal ascending aorta
2 – Sinotubular junction
3 – Aortic valve annulus

Three landing zones
ABSTRACT

Cardiac repair prostheses, sets, and methods for implanting in an aorta are disclosed. Cardiac repair prosthesis sets can include a radially expandable support supporting a unidirectional valve that is configured for implantation into the aortic valve region of a patient and a second radially expandable support for a substantially blood impervious stent having a size and shape for implantation into the ascending aorta of said patient where the unidirectional valve and stent are configured for integration within the patient by at least one joining element. Cardiac repair prostheses can include a radially expandable support supporting a unidirectional valve configured for implantation into the aortic valve region of a patient and a second radially expandable support for a substantially blood impervious stent having a size and shape for implantation into the ascending aorta of said patient where the unidirectional valve and stent are joined by at least one joining element.
Endovascular approach to Type A dissection

Challenges

- AI
  - ✔️ Eliminate AI
- Entry in the ascending
  - ✔️ Close the entry
- Effusion/tamponade
  - ✔️ Drain tamponade

Supracoronary ascending replacement saves the life in most cases
Type A endovascular single stentgraft CT feasibility studies

**Computed tomography-based study exploring the feasibility of endovascular treatment of type A aortic dissection in the Chinese population.**


**Computed tomography-based anatomic characterization of proximal aortic dissection with consideration for endovascular candidacy.**

Moon MC¹, Greenberg RK, Morales JP, Martin Z, Lu Q, Dowdall JF, Hernandez AV.

**Anatomic Feasibility of Next-Generation Stent Grafts for the Management of Type A Aortic Dissection in Japanese Patients.**

Fujimura N¹,²,³, Kawaguchi S³, Obara H³, Yoshitake A³, Inoue M³, Otsubo S³, Kitagawa Y³, Shimizu H³.

**Endovascular approaches to acute aortic type A dissection: a CT-based feasibility study.**

Sobocinski J¹, O'Brien N, Maurel B, Bartell M, Goueffic Y, Saesard T, Midulla M, Kossa M, Vincentelli A, Haulon S.

**Inoperable patients with acute type A dissection: are they candidates for endovascular repair?**

Roselli EE¹, Hasan SM¹, Idrees JJ¹, Aftab M¹, Eagleton MJ², Menon V², Svensson LG¹.
Type A endovascular single stentgraft CT feasibility studies

Feasibility parameters:
- No AI
- Classical TEVAR landing zones
- Entry in the ascending
- Non-aneurysmatic aorta
Dissection aortic anatomy

✓ University Heart Center Freiburg
✓ Time: 2004 to 2016
✓ 394 patients with acute Type A dissection
✓ 167 with good quality CT
  ✓ 85% entry in the ascending aorta
  ✓ 94% more than 10 mm distance between coronary artery and aortic valve annulus
Median distance between coronary artery ostia and STJ was $2.6 \pm 1.5$ mm (LCA) and $3.2 \pm 1.7$ mm (RCA)
Dissection changes the ascending anatomy

Implantation in 3D printed aorta
Implantation in a porcine model
Conclusions

✓ The technology is HERE

✓ Understanding of the pathology and courage will lead to successful treatment of acute Type A dissection with endo-conduit

✓ The future will not wait! The day when the MAJORITY of Type A dissection will be treated by endo-conduit will come
Double branched implantation: live-in-box