Parallel grafts (snorkels, chimneys and sandwich) in endovascular TAAA-repair: techniques, results, and current indications

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✓ Nothing to Disclose
Techniques Indications

Chimney Graft (ChG) vs Sandwich Graft (SG)

They work very well, however they are NOT a miracle

✓ ChG: Juxtarenal and Pararenal Aortic Aneurysms
Techniques Indications

Chimney (ChG) vs Sandwich (SG)

They work very well, however they are NOT a miracle.

✓ SG: Thoracoabdominal Aortic Aneurysms
**Sandwich Technique**

**SG: Thoracoabdominal Aortic Aneurysms**

**Aortic Arch**
- Type I or II
- Both Subclavian A. Open
- No LIMA Bypass
- No Debranching

**Proximal Neck**
- ≥ 15mm in Length
- ≤ 40 mm in Diameter
- No Complex Imaging Program
Sandwich Technique

SG: Thoracoabdominal Aortic Aneurysms

First Thoracic Endograft
Conformable and Flexible
No Proximal Freeflow
Long Endograft ≥ 20cm
Finishing 1-2cm above CT
Sandwich Technique

SG: Thoracoabdominal Aortic Aneurysms

Vascular Access

4 Vessels Revascularization
Left. Subclavian Open Approach
R brachial Punction & Femoral Punction
One 20Fr Sheath (28cm)
Four 7-8Fr Long Sheath (90cm)

2-3 Vessels Revascularization
Left Subclavian Open Approach
R brachial Punction
One 20 Large Sheath (28cm)
Two/Three 7-8F Long Sheath (90cm)

Target Vessel

Diagnostic Catheter
VERT, MP, IM, Berestein, Simmons
5F 110 or 125cm long

Guide wire
Cannulation: Terumo Stiff 0.035 260cm
Exchanged: Extra stiff 0.035 260cm
Short Floppy Tip (Amplatz)
Sheath
Inside TV 2-3cm
Be careful w/ SMA & CT side branched

CICE 2017

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Sheraton São Paulo WTC Hotel,
São Paulo, Brazil
www.cice.com.br
Sandwich Technique

SG: Thoracoabdominal Aortic Aneurysms

SECS
Conformable and Flexible
Good Redial Force
Adequate Visibility
Options in Size and Length
1mm bigger than the TV
2cm inside the TV
6cm inside the first thoracic Endograft
In General w/ 100-150mm in Length
All Undeployed

Abdominal Endograft
Main Body Deployment
Below the Lowest Renal A.
Proximal Diameter < Thoracic Endograft
Iliac Limb End above the Iliac Bifurcation
Sandwich Technique
✓SG: Thoracoabdominal Aortic Aneurysms

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Sandwich Technique
✓ SG: Thoracoabdominal Aortic Aneurysms

Second Thoracic Endograft
30% Oversizing then the 1st One
5cm Overlapping of the SECS
SECS 1cm above the 2nd One
3cm Overlapping of the Abdominal Endograft

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Sandwich Technique

✓ SG: Thoracoabdominal Aortic Aneurysms

Second Thoracic Endograft
Endograft Deployment
Retrieve Sheath inside the TV
All SECS Undeployed
Latex balloon Accomodation
Mainly in the Overlapping (SECS, Endografts)
Sandwich Technique

SG: Thoracoabdominal Aortic Aneurysms

SECS Deployment
Bare Stent Inside Is Mandatory
SECS Angioplasty Is Not Mandatory

Abdominal Endograft
Contralateral Limb Deployment
Iliac Limb End above the Iliac Bifurcation
Sandwich Technique

SG: Thoracoabdominal Aortic Aneurysms
First Thoracic Stent-graft

Second Thoracic Stent-graft

Sandwich Technique

✓ SG: Thoracoabdominal Aortic Aneurysms
Sandwich Technique

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Sandwich Technique

✓ SG: Thoracoabdominal Aortic Aneurysms

Second Thoracic Stent-graft

Viabahn
Sandwich Technique

*SG: Thoracoabdominal Aortic Aneurysms*

- Flexible Stent-graft
  - 5 cm overlapping

- Bridge Stent
  - Good radial force and flexibility
TABLE 1. PATIENT SELECTION CRITERIA FOR THE SANDWICH TECHNIQUE

<table>
<thead>
<tr>
<th>FIT</th>
<th>UNFIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAAA repair</td>
<td>Previous bilateral LIMA bypass</td>
</tr>
<tr>
<td>• Unfit for open surgery</td>
<td>• Previous aortic arch debranching</td>
</tr>
<tr>
<td>• Urgent setting (rupture, rapid growth,</td>
<td>• Bilateral subclavian artery occlusion</td>
</tr>
<tr>
<td>aneurysm size ≥ 70 mm)</td>
<td>• Type III aortic arch</td>
</tr>
<tr>
<td>• Type B aortic dissection with narrow</td>
<td>• Descending TAA with no proximal neck</td>
</tr>
<tr>
<td>true lumen</td>
<td>• Visceral arteries &lt; 4 mm in diameter</td>
</tr>
<tr>
<td>• Very tortuous TAAA at visceral level</td>
<td></td>
</tr>
<tr>
<td>AIA repair</td>
<td>HA &lt; 4 mm in diameter</td>
</tr>
<tr>
<td>• No bilateral distal CIA landing zone</td>
<td>• Poor HA runoff</td>
</tr>
<tr>
<td>• No unilateral distal CIA landing zone</td>
<td>• Severe HA ostial stenosis (&gt; 80%)</td>
</tr>
<tr>
<td>plus contralateral HAA or contralateral</td>
<td></td>
</tr>
<tr>
<td>HA with previous occlusion/severe</td>
<td></td>
</tr>
<tr>
<td>stenosis</td>
<td></td>
</tr>
<tr>
<td>• AAA with bilateral, short, healthy</td>
<td></td>
</tr>
<tr>
<td>CIA (no bilateral distal landing</td>
<td></td>
</tr>
<tr>
<td>zone)</td>
<td></td>
</tr>
</tbody>
</table>
Tips for ChG to Repair Juxtarenal & Pararenal Aneurysms

✓ You should follow some rules:

- One ChG: needs a health neck of **1.5cm** in length.
- Two ChG: need a health neck of **2.0cm** in length.
- Three ChG: need a health neck of **2.5cm** in length.
- Four ChG: it is **NOT** advisable (3 ChG and 1 SG)
  - Proceed to one renal with Sandwich Periscope.
Tips for ChG to Repair Juxtarenal & Pararenal Aneurysms

✓ You should follow some rules:

- One Chimney: 20% Endograft oversizing.
- Two and three Chimneys: 30% Endograft oversizing.
- Four Chimneys: it is NOT advisable.
- Proceed to one renal with Sandwich Periscope.
Tips for ChG to Repair Juxtarenal & Pararenal Aneurysms

✓ You should follow some rules:

• First: Endograft deployment.
• Second: Latex balloon accommodation.
• Third: Covered stent deployment (if you have used a self-expandable one).
• Fourth: Bare-metal self-expandable stent deployment inside of the covered stent (if you have used a self-expandable one).
Tips for ChG to Repair Juxtarenal & Pararenal Aneurysms

✓ You should follow some rules:

✓ Covered Stents (CS): Options in Size and Length
  - 1mm bigger than the Target Vessel (self expandable)
  - 2cm inside the Target Vessel
  - Overall w/ 50mm in length
  - The CS proximal end above the celiac axis is advisable
Tips for ChG to Repair Juxtarenal & Pararenal Aneurysms

Very Tortuous TAAA at Visceral Level

Iliac Aneurym w/ iliac limb migration
Tips for ChG to Repair Juxtarenal & Pararenal Aneurysms
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CT
SMA
LRA
RRA
Tips for ChG to Repair Juxtarenal & Pararenal Aneurysms

CT
SMA
RRA
LRA
Tips for ChG to Repair Juxtarenal & Pararenal Aneurysms
Tips for ChG to Repair Juxtarenal & Pararenral Aneurysms
<table>
<thead>
<tr>
<th>Aneurysm Type</th>
<th>N °</th>
<th>FU (mo)</th>
<th>ST (%)</th>
<th>CT (%)</th>
<th>TV</th>
<th>Urgent (%)</th>
<th>Unfit Fenest/branched</th>
<th>N° Stent-grafts</th>
<th>N° Covered Stent</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAAA I</td>
<td>6</td>
<td>28</td>
<td>6(15.8)</td>
<td>-</td>
<td>24</td>
<td>0</td>
<td>3</td>
<td>30</td>
<td>22</td>
</tr>
<tr>
<td>TAAA II</td>
<td>5</td>
<td>10</td>
<td>5(13.1)</td>
<td>-</td>
<td>18</td>
<td>1 (20)</td>
<td>2</td>
<td>19</td>
<td>16</td>
</tr>
<tr>
<td>TAAA III</td>
<td>6</td>
<td>16</td>
<td>6(15.8)</td>
<td>-</td>
<td>23</td>
<td>1 (16.6)</td>
<td>3</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>TAAA IV</td>
<td>16</td>
<td>20</td>
<td>16</td>
<td>-</td>
<td>63</td>
<td>1 (7.7)</td>
<td>7</td>
<td>32</td>
<td>59</td>
</tr>
<tr>
<td>TAAA V</td>
<td>7</td>
<td>24</td>
<td>5</td>
<td>2</td>
<td>26</td>
<td>1 (14.3)</td>
<td>3</td>
<td>12</td>
<td>25</td>
</tr>
<tr>
<td>Juxtarenal</td>
<td>38</td>
<td>18</td>
<td>-</td>
<td>38</td>
<td>88</td>
<td>5 (13.1)</td>
<td>14</td>
<td>38</td>
<td>83</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>78</strong></td>
<td><strong>19.3</strong></td>
<td><strong>38</strong></td>
<td><strong>40</strong></td>
<td><strong>242</strong></td>
<td><strong>9 (11.5%)</strong></td>
<td><strong>32 (41%)</strong></td>
<td><strong>153 (2.0pp)</strong></td>
<td><strong>227 (2.9pp)</strong></td>
</tr>
</tbody>
</table>
## Sandwich and Chimney Endografts: Mid-Term Outcomes

<table>
<thead>
<tr>
<th>Aneuysm Type</th>
<th>Tech. Success per vessel(%)</th>
<th>Visceral Patency (%)</th>
<th>30-day Rel. Mortal (%)</th>
<th>IntraOp. Endoleak (%)</th>
<th>Persisted Endoleak (%)</th>
<th>Reinterv (%)</th>
<th>SCI(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAAA I</td>
<td>22/24 (91.7)</td>
<td>22/22 (100)</td>
<td>0 (0)</td>
<td>2/6 (33.3)</td>
<td>1/6 (16.7)</td>
<td>2/6 (33.3)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>TAAA II</td>
<td>16/18 (88.9)</td>
<td>15/16 (93.7)</td>
<td>1/5 (20)</td>
<td>1/5 (20.0)</td>
<td>0 (0)</td>
<td>1/5 (20.0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>TAAA III</td>
<td>22/22 (95.7)</td>
<td>21/22 (95.4)</td>
<td>0 (0)</td>
<td>1/6 (16.7)</td>
<td>1/6 (16.7)</td>
<td>1/6 (16.7)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>TAAA IV</td>
<td>59/63 (93.7)</td>
<td>57/59 (96.6)</td>
<td>2/16 (12.5)</td>
<td>2/16 (12.5)</td>
<td>1/16 (6.2)</td>
<td>3/16 (18.8)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>TAAA V</td>
<td>25/26 (96.2)</td>
<td>25/25 (100)</td>
<td>0 (0)</td>
<td>1/7 (14.3)</td>
<td>1/7 (14.3)</td>
<td>1/7 (14.3)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Juxtarenal</td>
<td>83/88 (94.3)</td>
<td>78/83 (94.0)</td>
<td>3/38 (7.9)</td>
<td>5/38 (13.2)</td>
<td>3/38 (7.9)</td>
<td>5/38 (13.2)</td>
<td>0 (0)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>227/242 (94.3)</strong></td>
<td><strong>218/227 (96.0)</strong></td>
<td><strong>6/78 (7.7)</strong></td>
<td><strong>12/78 (15.4)</strong></td>
<td><strong>7/78 (9.0)</strong></td>
<td><strong>13 (16.7)</strong></td>
<td><strong>0 (0)</strong></td>
</tr>
</tbody>
</table>
Conclusions

✓ The Parallel technique appears to be a good addition to the endovascular armamentarium for treatment of complex aortic aneurysms.

✓ More experience with the method is advisable
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- Sessions from World Famous International Meetings - LINC, VIVA, American Venous Forum (AVF)
- Edward B. Diethrich (EBD) Best Abstract Award
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