When do Parallel Grafts Work and When Don’t They and Why

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When to Use Parallel Grafts

Disclosures

- Clinical Investigator – paid to UAB
  - Gore, Medtronic, Endologix, Lombard, Aptus, Trivascular, Cords
- Consultant – paid to UAB
  - Gore, Medtronic, Trivascular, Lombard, Aptus, Terumo
- Equity Shareholder
  - None

When to Use Parallel Grafts

Parallel Grafts -

- Early reports – bailout for inadvertent coverage of renal or hypogastric, to preserve flow to important branch arteries
- The envelope was soon pushed to the next level . . . To treat more aorta across branch vessels while avoiding open repair!

Example: 3 vessel snEVAR

Reported World Experience

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Location</th>
<th>Patients</th>
<th>Branches</th>
<th>Mortality</th>
<th>Graft occlusion</th>
<th>CT results</th>
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<tbody>
<tr>
<td>Larzon</td>
<td>2008</td>
<td>JCVS</td>
<td>Orebro</td>
<td>12</td>
<td>13</td>
<td>8.3%</td>
<td>19</td>
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<td>Ohrlander</td>
<td>2008</td>
<td>JEVT</td>
<td>Malmo</td>
<td>6</td>
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<td>0</td>
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<tr>
<td>Hiramoto</td>
<td>2009</td>
<td>JVS</td>
<td>UCSF</td>
<td>8</td>
<td>8</td>
<td>0%</td>
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<tr>
<td>Bruen</td>
<td>2011</td>
<td>JVS</td>
<td>Florida</td>
<td>21</td>
<td>36</td>
<td>4.8%</td>
<td>1</td>
</tr>
<tr>
<td>Coscas</td>
<td>2011</td>
<td>JVS</td>
<td>Paris</td>
<td>16</td>
<td>28</td>
<td>12.5%</td>
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<td>Donas</td>
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<td>AVS</td>
<td>German-Swiss</td>
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<tr>
<td>Donas/Lee</td>
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<td>JEVT</td>
<td>German-Swiss</td>
<td>40</td>
<td>73</td>
<td>2</td>
<td>1/7 (G)</td>
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<td>Lee</td>
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<td>AVS</td>
<td>Belgium</td>
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<td>59</td>
<td>7.1%</td>
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<td>JVS</td>
<td>Munich</td>
<td>10</td>
<td>22</td>
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<td>1</td>
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<tr>
<td>Schirn</td>
<td>2015</td>
<td>AVS</td>
<td>Manchester</td>
<td>9</td>
<td>9</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Resch</td>
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<td>Graz</td>
<td>25</td>
<td>48</td>
<td>12%</td>
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<td>Czarnecki</td>
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<td>JCVS</td>
<td>Graz</td>
<td>217</td>
<td>598</td>
<td>4.8%</td>
<td>5.9%</td>
</tr>
</tbody>
</table>

VEITH INSIGHTS
When to Use Parallel Grafts

**PERICLES Registry**
- 516 patients
  - 2008-2014
  - European and US centers
- 898 parallel grafts
  - 696 renals
  - 156 SMA
  - 50 celiac
  - 17 month FU
- 95% patency
- 75% survival

- 49.5% Endurant
- 17.3% Zenith
- 14.3% Excluder
- 50.4% ICAST
- 39.5% Viabahn
- 25.4% "endolining"

When are parallel grafts needed if fenestrated and branched grafts are here?
- Manufacturing time delays care
- Patient’s anatomy does not always fit
  - Creativity is required . . .
  - Iliac access
  - Branch vessel tortuosity
  - Aortic tortuosity
- Add complexity working through fenestrations

When to Use Parallel Grafts

**Use Fenestrated Grafts when possible**
- 17 Snorkel
- 41 ZFEN
- 30% oversizing works best
- Endurant compressed parallel graft most (self expanding more)
- Excluder + ICAST had largest gutters

**Balloon vs Self Expanding stents for parallel grafts**
- de Bruin JEVT 2013

**Oversizing branch graft**
When to Use Parallel Grafts

**Manipulating the parallel graft**
- "eye of the tiger"
- Minion Kentucky Technique
- Overdilating snorkel
- Flattening the snorkel
- Expanding to smaller diameter

**IVUS image of single parallel graft:**
It’s not always a perfect circle!!

**“Gutter Leaks” = Type 1G endoleak**
length > 2cm helps

**snEVAR with Sandwich landing zones**
snorkel and periscope orientation into prior grafts

77yo WM – COPD
- 12/2007 – TAG graft
- Feb 2013 – Type 1 EL
  - Paravisceral degeneration
  - 7.5 cm
  - Suprarenal stents migrated below renals

**Snorkel Graft in Celiac, SMA; Periscope grafts in Renals**

CT Imaging – 2 years later
When to Use Parallel Grafts

2 year Durability of Renal Periscope

- March 2013
- April 2013
- Feb 2015

Chimney Grafts work for some high risk patients Zone 0
Arch Repair with Chimney Graft – 5 years later!

Viabahn + ICAST

When to Use Parallel Grafts

- When to use parallel grafts?
  - Patient not well suited for standard therapy
    - Consider fenestrated endograft – timing or anatomy
    - Consider open surgical repair
  - How to use parallel grafts
    - Various sizing algorithms for the aortic graft – 30% oversizing seems best
    - Longer lengths improve gutter thrombosis
    - Size branch graft for target vessel

  - CAVEATS about parallel graft
    - Unclear long term durability, recent reports show some promise
    - Violates basic principles of endografting – seal and fixation
    - Branch cannulation/graft delivery can be difficult – end organ at risk
    - Angulated aorta and branches add to difficulty
    - Likely avoid any working through a fenestrated graft
    - Superior approach can limit maneuverability
    - Arch disease increases mortality

Key Features for Success

- Match endograft to parallel graft
  - Endurant, Zenith → ICAST
  - Excluder → Viabahn

- More parallel grafts → higher endoleak rate
- More length provides more area for seal
- Pursue >2 cm neck length for seal

VEITH SYMPOSIUM
Connecting the Vascular Community