Thoracic Aorta – Bifemoral Bypasses are Useful when other Revascularizations have Failed: Tips and Tricks to make the Procedure Simple

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Disclosure

I have no relevant financial relationships to disclose

Thoracofemoral / Iliac Bypass

Initial Reports

• 1961: JK Stevenson
  • A bypass homograft from thoracic aorta to femoral arteries for occlusive vascular disease

• 1962: FW Blaisdell
  • Extraperitoneal thoracic aorta to femoral bypass graft as replacement for an infected aortic bifurcation prosthesis

Thoracofemoral / Iliac Bypass

Indications

• Failure of prior aortic reconstruction
• Aortic graft infection (staged)
• Hostile abdomen (surgical, radiation, infection)
• Multiple interventions on axillofemoral bypass
• Suprarenal aortic stenosis
  - Middle aortic syndrome
  - Atherosclerosis

Thoracofemoral / Iliac Bypass

Considerations

• Thoracic / supraceliac aorta less likely involved with atherosclerosis
• Avoids intra-peritoneal dissection and adhesions
• Adequate respiratory function to tolerate thoracotomy
• Extraperitoneal exposure of supraceliac aorta

Thoracofemoral / Iliac Bypass

Juxtarenal Aortic Occlusion

• Concern for proximal extension of thrombus
• Involvement of renal / visceral arteries

Primary reconstruction for juxtarenal aortic occlusion (controversial)
**Indications**

**Juxtarenal Aortic Occlusion**

- 62% (31/50) primary procedures
- 21 – aortic occlusion
- 10 – severe stenosis
- PP – 79%, SP – 93% at 5 years

Support a more liberal use for primary revascularization.

**Extensive Aortoiliac Disease**

**Technique**

- Right lateral decubitus position
- Thorax at 45°
- Pelvis horizontal
- Double lumen endotracheal tube

- Left posterolateral thoracotomy through 7th, 8th or 9th interspace
- Side-biting aortic clamp
Technique

- Cross limb subcutaneous
- Cross limb retroperitoneal

Tunneling

- E. coli septicemia 5 days post TF bypass
- Prior resection + RT neuroblastoma at age 4

Tunneling

Results

<table>
<thead>
<tr>
<th>Study</th>
<th>Duration (yrs)</th>
<th>No. of pts</th>
<th>Mort %</th>
<th>Morb %</th>
<th>Mean FU (mths)</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>McCarthy 1986</td>
<td>10</td>
<td>21</td>
<td>0</td>
<td>0</td>
<td>44</td>
<td>4-year patency 100%</td>
</tr>
<tr>
<td>Schultz 1986</td>
<td>13</td>
<td>15</td>
<td>8</td>
<td>20</td>
<td>37</td>
<td>Actuarial patency rate 92.2%</td>
</tr>
<tr>
<td>Branchereau 1989</td>
<td>6</td>
<td>15</td>
<td>10</td>
<td>16</td>
<td>14</td>
<td>Primary patency 86.3% and secondary patency 100%</td>
</tr>
<tr>
<td>Kallman 1981</td>
<td>4</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>17</td>
<td>Primary patency 100%</td>
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</tr>
<tr>
<td>Passman 1994</td>
<td>15</td>
<td>58</td>
<td>4</td>
<td>16</td>
<td>30</td>
<td>Primary patency, secondary patency, limb salvage, and survival: 79%, 86%, 60%, and 61%, respectively</td>
</tr>
<tr>
<td>Heppert 2014</td>
<td>7</td>
<td>13</td>
<td>0</td>
<td>38</td>
<td>16</td>
<td>100% axial patency, 15% secondary amputation</td>
</tr>
<tr>
<td>Crawford 2018</td>
<td>15</td>
<td>61</td>
<td>5</td>
<td>34</td>
<td>9.3</td>
<td>Re-intervention 12%, 5-year primary limb patency, freedom from MALE, and survival were 83.2%, 78.1%, 65.4%, and 66.4%, respectively</td>
</tr>
</tbody>
</table>
Mayo Experience

1982 - 2018
35 patients

Failed Ax-Fem =3 (9%)
Suprarenal stenosis = 9 (26%)
Midaort S = 5
Athero = 4
Hostile Abd = 10 (29%)
Prior Sx = 3
Radiation = 7
Failed ABFG =13 (37%)
Occlusion -12
Infection - 1

In-hospital mortality 0
Myocardial infarction 0
A Fib / Angina 1
Respiratory failure (trach) 1
Renal failure ( temporary HD) 1
Paraplegia / stroke 0
Return to OR 1
Hospital stay (Median days) 7

Early Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-hospital mortality</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>A Fib / Angina</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>Respiratory failure (trach)</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>Renal failure ( temporary HD)</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>Paraplegia / stroke</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Return to OR</td>
<td>1</td>
<td>3%</td>
</tr>
</tbody>
</table>

Long Term Results

• Median Clinical FU – 6 years (1 mth – 26 yrs)
• Median Imaging FU – 3 years (1 mth – 22 yrs)
  • TF Graft occlusion during FU = 1 pt
  • Femoro-femoral graft occlusion = 3 pts
  • Fem – fem limbs salvaged = 2 pts
• 4 Deaths during FU - 2/6/13/14 years
• 0 Aortic related

Primary & Secondary Patency

<table>
<thead>
<tr>
<th>TF Grafts</th>
<th>No. at risk</th>
<th>Primary Patency</th>
<th>Secondary Patency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Femoro-femoral crossover</td>
<td>22</td>
<td>93%</td>
<td>93%</td>
</tr>
<tr>
<td>No. at risk</td>
<td>35</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
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</tbody>
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Conclusions

• Descending thoracic aorto-iliac /femoral bypass is associated with low operative mortality, few complications and excellent long-term patency
• DTAI/F bypass remains a viable option for lower extremity revascularization in patients with failed prior open / endovascular aortoiliac reconstruction
• Primary DTAI/F is also indicated when adequate inflow from the abdominal aorta cannot be provided.