Chronic dissecting aneurysms: Is open repair still the gold standard?

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Main Line Health Care System
Professor Sidney Kimmel Medical College
Thomas Jefferson University
Chronic Type B Dissection

• Descending enlargement

• Distal progression

• Fatal rupture : 20%
Chronic Type B Dissection
Case Presentation

- 27 yo male
- Marfan’s
- Chronic dissection
- Stent placement
- Endoleak
- Aortic enlargement
Open Surgical Treatment

• Extensive Operations

• Need of CPB ± DHCA

• Risk of Paraplegia

• Post-operative Mortality and Morbidity
The Risk of Paraplegia- 2016
Crawford Classification (n = 3309)

Goals during Open Repair of TAA Aneurysms

- Spinal Cord Protection
- Cerebral Protection
- Visceral Organ Protection
Current LMC Technique

• Systemic heparinization (3 mg/kg)

• Mild systemic hypothermia: 32°C

• Distal perfusion (femoral-femoral bypass)
CSF Drainage Technique

- CSF catheter: L4-L5 or L3-4
- CSF pressure $\leq$ 10mmHg
- CSF drainage: 10 cc/h
- CSF drainage for 72 hours
Visceral / Renal Perfusion

- Blood (from cardioplegia line)

- Rate at 250-300 cc/min
DHCA: Indications

• Proximal clamping is not feasible

• Need to clamp above the left subclavian?

• Previous Abdominal Aortic Aneurysm repair

• Type II Aneurysms
• Thoracoabdominal position
• Incision in the 6th intercostal space
• Retroperitoneal exposure of abdominal aorta
• Circumferential division of the diaphragm
• Exposure of left renal artery
• Identification of the vagus and left laryngeal nerves
Current LMC Technique

Postoperative Management

• Mean BP: 85-95mmHg
• CSF drainage for 72 hr
• CSF drainage at 10 cc/hr
• Steroids for 48 hrs
Type 2 TAAA with RCA stenosis

- 67 yo male
- Symptomatic
- Type B Aortic Dissection
- S/p aorto-bifemoral bypass
- Atrophic left kidney
- Severe RCA stenosis
Redo Type 3 TAAA

54 yo male

• Back pain
• s/p descending thoracic aortic repair
• s/p ascending root repair (Florida Sleeve)
• Type 3 TAAA
Stroke Prevention

Cannulation Techniques
  Left Axillary Cannulation
  Ascending Aorta Cannulation
  Arch cannulation

Stage I Elephant Trunk
Case Presentation

- 67 yo female
- Symptomatic
- Ruptured pseudoaneurysm of the distal descending aorta
- Pseudoaneurysm of the proximal descending aorta
- Grade 5 atherosclerosis of descending aorta
Endovascular Treatment

• Decreases Access Trauma

• Decreases Blood Loss

• Reduces Length of Stay
Type B Chronic Dissecting Aneurysms

Questions

• Does endovascular surgery treat the same patients as open surgery?

• Does endovascular surgery treat the same extent of aorta?

• Does endovascular surgery deliver the same long-term outcomes?
Chronic Descending and Thoracoabdominal Aortic Dissections

2000–2017

Total Cases 110

male 79 72%

Age 57 ± 10
<table>
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<td>Type 3</td>
<td>15</td>
<td>14%</td>
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<tr>
<td>Type 4</td>
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Operative variables

- Aortic X time: 53 ± 25
- CPB time: 82 ± 72
Mortality and Morbidity

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<tr>
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<th>Count</th>
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# Operative Complications

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<td>Stroke</td>
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## Open – Demographics

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<td>64%</td>
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<td>77%</td>
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## Endovascular – Demographics

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<tr>
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<tr>
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### Endovascular

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<td>100%</td>
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## Open

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<th>Stroke</th>
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<tr>
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<td>Cambria 2008</td>
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<td>7%</td>
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<tr>
<td>Coselli 1997</td>
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<td>3%</td>
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<td>6%</td>
<td>3%</td>
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<tr>
<td>Bogerijen 2015</td>
<td>90</td>
<td>6%</td>
<td>4%</td>
<td>1%</td>
</tr>
<tr>
<td>Fujikawa 2015</td>
<td>234</td>
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<tr>
<td><strong>Average</strong></td>
<td><strong>798</strong></td>
<td><strong>7.9%</strong></td>
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## Endovascular

<table>
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<th>N</th>
<th>Mortality</th>
<th>Paraplegia</th>
<th>Stroke</th>
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<td>Guangui 2009</td>
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<tr>
<td>Alves 2009</td>
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<td>2%</td>
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<tr>
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<td>0%</td>
<td>0%</td>
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<td>Nathan 2015</td>
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<tr>
<td>Kang 2011</td>
<td>76</td>
<td>5%</td>
<td>0%</td>
<td>1%</td>
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<tr>
<td>Kitamura 2013</td>
<td>45</td>
<td>0%</td>
<td>0%</td>
<td>4%</td>
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<tr>
<td>Bogerijen 2015</td>
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<td>Verhoeven 2015</td>
<td>166</td>
<td>9%</td>
<td>1%</td>
<td>1%</td>
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<tr>
<td><strong>Average</strong></td>
<td><strong>567</strong></td>
<td><strong>5%</strong></td>
<td><strong>1.1%</strong></td>
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## Open – Complications

<table>
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<th>Renal</th>
<th>Pulmonary</th>
<th>LOS</th>
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<td>N/A</td>
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<td>15%</td>
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<tr>
<td>Cambria 2008</td>
<td>73</td>
<td>11%</td>
<td>49%</td>
<td>N/A</td>
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<tr>
<td>Coselli 1997</td>
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<td>Kouchoukos 2015</td>
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<td>N/A</td>
<td>10</td>
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<tr>
<td>Bogerijen 2015</td>
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<td>8%</td>
<td>4%</td>
<td>N/A</td>
</tr>
<tr>
<td>Fujikawa 2015</td>
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<td>10%</td>
<td>33%</td>
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<tr>
<td>Average</td>
<td>798</td>
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## Endovascular – Complications

<table>
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<tr>
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<th>LOS (mean)</th>
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<td>Parsa 2011</td>
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<td>2%</td>
<td>N/A</td>
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<tr>
<td>Nathan 2015</td>
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<td>2%</td>
<td>N/A</td>
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<td>Kang 2011</td>
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<td>1%</td>
<td>N/A</td>
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<tr>
<td>Kitamura 2013</td>
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<td>0%</td>
<td>N/A</td>
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<td>Bogerijen 2015</td>
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<td>4%</td>
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<td>Verhoeven 2015</td>
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<tr>
<td>Average</td>
<td>567</td>
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</table>

### Renal Complications

- **Griep 2010**: 5%
- **Plestis 2011**: 5%
- **Cambria 2008**: 11%
- **Kouchoukos 2015**: 5%
- **Bogerijen 2015**: 8%
- **Fujikawa 2015**: 10%
- **Average**: 7.9%

### Pulmonary Complications

- **Griep 2010**: N/A
- **Plestis 2011**: 20%
- **Cambria 2008**: 49%
- **Kouchoukos 2015**: N/A
- **Bogerijen 2015**: 4%
- **Fujikawa 2015**: 33%
- **Average**: 25.4%

### LOS

- **Griep 2010**: 18 days
- **Plestis 2011**: 17 days
- **Cambria 2008**: N/A
- **Kouchoukos 2015**: 10 days
- **Bogerijen 2015**: N/A
- **Fujikawa 2015**: N/A
- **Average**: 15 days
Survival and Chronic Dissection

Survival Probabilities

Survival Time (Years)

1 m 95%
1 y 92%
5 y 85%
10 y 72%
15 y 68%
## Follow Up Survival - Open

<table>
<thead>
<tr>
<th>Study</th>
<th>N</th>
<th>Months</th>
<th>1 year</th>
<th>5 years</th>
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<td>81</td>
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<tr>
<td>Plestis 2011</td>
<td>83</td>
<td>44</td>
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<td>70%</td>
<td>58%</td>
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<tr>
<td>Cambria 2008</td>
<td>65</td>
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</tr>
<tr>
<td>Kouchoukos 2015</td>
<td>69</td>
<td>64</td>
<td>86%</td>
<td>65%</td>
<td>40%</td>
</tr>
<tr>
<td>Bogerijen 2015</td>
<td>90</td>
<td>35</td>
<td>88%</td>
<td>87%</td>
<td>N/A</td>
</tr>
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<td>Fujikawa 2015</td>
<td>234</td>
<td>N/A</td>
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<td>N/A</td>
<td>N/A</td>
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<tr>
<td>Average</td>
<td>583</td>
<td>53</td>
<td>87%</td>
<td>70%</td>
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## Follow Up Survival - Endovascular

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<td>90%</td>
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<td>N/A</td>
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<td>Sayer 2008</td>
<td>40</td>
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<tr>
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<td>86%</td>
<td>77%</td>
<td>78%</td>
<td>NC</td>
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Freedom from Reoperation

**Freedom from Re-Operation:** 90% at 5 years and 86% at 7 years
**Freedom from Subsequent Intervention**

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<tr>
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<th>Griep N=81</th>
<th>Plestis N=83</th>
<th>Gambria N=65</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Freedom from Distal Surgery</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 year</td>
<td>99%</td>
<td>98%</td>
<td>79%</td>
</tr>
<tr>
<td>5 years</td>
<td>93%</td>
<td>90%</td>
<td></td>
</tr>
<tr>
<td>10 years</td>
<td>83%</td>
<td></td>
<td>69%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Alves N=45</th>
<th>Sayer N=40</th>
<th>Parsa N=51</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>New Intervention at site</strong></td>
<td>22.0%</td>
<td>16%</td>
<td>12%</td>
</tr>
<tr>
<td><strong>Distal Intervention</strong></td>
<td>N/A</td>
<td>22%</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Freedom from Reintervention</strong></td>
<td>N/A</td>
<td>55%</td>
<td>80%</td>
</tr>
<tr>
<td>1 year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 years</td>
<td></td>
<td></td>
<td>77%</td>
</tr>
</tbody>
</table>
Conclusion

• Hospital outcomes for open chronic distal dissection repair are excellent

• The long-term mortality and reoperation rates are low
Conclusions

• Both open and endovascular operations in the thoracoabdominal aorta remain extremely complex operations.

• The results of open repair of TAAA have improved significantly over the last decade in centers of excellence.

• The long term outcomes of endovascular operations have not been determined yet.

• Open TAA repair remains the procedure of choice in appropriately selected candidates.
Thank you

(914)874-7453
dplestis@gmail.com
### Surgical Variables

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DHCA</td>
<td>52%</td>
<td>43%</td>
<td>0%</td>
<td>0.5%</td>
<td>N/A</td>
<td>100%</td>
<td>78%</td>
<td>2.6%</td>
<td>24%</td>
</tr>
<tr>
<td>DAP</td>
<td>44%</td>
<td>50%</td>
<td>22%</td>
<td>17%</td>
<td>83%</td>
<td>42%</td>
<td>N/A</td>
<td>95%</td>
<td>60%</td>
</tr>
<tr>
<td>Clamp &amp; Saw</td>
<td>2%</td>
<td>7%</td>
<td>78%</td>
<td>73%</td>
<td>17%</td>
<td>0</td>
<td>N/A</td>
<td>5%</td>
<td>24%</td>
</tr>
<tr>
<td>Intercostal Implantation</td>
<td>10%</td>
<td>60%</td>
<td>67%</td>
<td>Yes</td>
<td>Yes</td>
<td>61%</td>
<td>Yes</td>
<td>32%</td>
<td>40%</td>
</tr>
<tr>
<td>CSF Drainage</td>
<td>70%</td>
<td>84%</td>
<td>70%</td>
<td>0%</td>
<td>83%</td>
<td>32%</td>
<td>87%</td>
<td>46%</td>
<td>57%</td>
</tr>
</tbody>
</table>
## DHCA

<table>
<thead>
<tr>
<th></th>
<th>DHCA</th>
<th></th>
<th>Non-DHCA</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>TAA+DTA</td>
<td>36</td>
<td>43%</td>
<td>52</td>
<td>57%</td>
</tr>
<tr>
<td>Mortality</td>
<td>3</td>
<td>8%</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>Paraplegia</td>
<td>1</td>
<td>3%</td>
<td>2</td>
<td>6%</td>
</tr>
</tbody>
</table>

Plestis JVS, 2011
Case presentation

62 yo patient

• Type I TAAA

• Grade V aortic arch

• Stenosis of the Celiac, SMA
Grade V Aortic Arch
Descending Thoracic Aorta
Celiac axis
Infrarenal Aorta
Stage I ET
Stage I ET

Trifurcation Graft
Conclusion

The role of stent-grafting for patients with *chronic dissections* present for more than 8 weeks after the acute event *is still uncertain*.

*Open* surgical graft replacement *is likely to be a better option* particularly in *young, good-risk patients*. 
Thank You
Survival and Dissection

- **Non Dissection**
  - 1 year: 95% 80%
  - 3 year: 85% 70%
  - 5 year: 80% 65%
  - 10 year: 65% 50%

- **Dissection**

p = 0.015
Outcomes
Thoracoabdominal Aneurysms

2000–2016

Total Cases  244

male  155  63%
female  89  37%

Age  62 ± 13
Etiology: N=244

- Medial Degen.: 38%
- Ather.: 23%
- Chr. Diss. Acute Diss.: 27%
- Other: 9%
- Other: 3%
Presentation: N=244

73% Elective
19% Rupture
8% Urgent
Aneurysm Type: N=244

- Type I: 56%
- Type II: 13%
- Type III: 16%
- Type IV: 16%
Aneurysm Type: N=244

Descending: 32%
Type 1: 24%
Type 2: 13%
Type 3: 16%
Type 4: 16%
## Distal Perfusion

- **No Distal perfusion**: 49 (20%)
- **Femoral-Femoral**: 122 (50%)
- **Atrial-Femoral**: 73 (30%)
- **DHCA**: 61 (25%)
Operative variables

- Aortic X time: 51±21
- CPB time: 101±87
- DHCA time: 28±8
Mortality and Morbidity

<table>
<thead>
<tr>
<th>Condition</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality</td>
<td>13</td>
<td>5.5%</td>
</tr>
<tr>
<td>Paraplegia</td>
<td>4</td>
<td>1.7%</td>
</tr>
</tbody>
</table>
Operative Complications

- Post-Op Bleeding: 8 cases, 3%
- Stroke: 6 cases, 2.5%
  - Embolic: 3 cases
  - Hemorrhage: 3 cases
New Onset Renal Complications:  
Cr>2.5

- New onset renal insufficiency: 25 (10%)
- New Onset Hemodialysis: 8 (3.5%)
- Ventilation>48h: 93 (38%)
Hospital Stay

Mean (days)  17±18
## Demographics

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=244</td>
<td>N=258</td>
<td>N=337</td>
<td>N=2286</td>
<td>N=445</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td>66</td>
<td>65</td>
<td>70</td>
<td>66</td>
<td>71</td>
</tr>
<tr>
<td><strong>Extent I + II</strong></td>
<td>69%</td>
<td>58%</td>
<td>44%</td>
<td>64%</td>
<td>42%</td>
</tr>
<tr>
<td><strong>Rupture</strong></td>
<td>19%</td>
<td>15%</td>
<td>13%</td>
<td>6%</td>
<td>11%</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------------</td>
<td>---------------------</td>
<td>-------------------</td>
<td>---------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Mortality</td>
<td>6%</td>
<td>10%</td>
<td>8%</td>
<td>7%</td>
<td>8%</td>
</tr>
<tr>
<td>SCI*</td>
<td>2%</td>
<td>11%</td>
<td>11%</td>
<td>3%</td>
<td>13%</td>
</tr>
<tr>
<td>Dialysis</td>
<td>4%</td>
<td>10%</td>
<td>13%</td>
<td>6%</td>
<td>21%</td>
</tr>
</tbody>
</table>

*SCI- Spinal Cord Ischemia*
## Survival

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Survival</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 year</td>
<td>85%</td>
<td>83%</td>
<td>54%</td>
<td>83%</td>
<td>55%</td>
</tr>
<tr>
<td>5 years</td>
<td>80%</td>
<td>63%</td>
<td>63%</td>
<td>63%</td>
<td></td>
</tr>
<tr>
<td>10 years</td>
<td>65%</td>
<td>34%</td>
<td>29%</td>
<td>37%</td>
<td>23%</td>
</tr>
</tbody>
</table>
Complex type 5 TAAA
Case Presentation

69 yo patient

• Type V  TAAA
Procedure

Repair of Type V TAAA
Reimplantation with graft:
  • Celiac trunk
  • SMA
  • Right and left renal arteries
Fem-Fem bypass
CSF drainage
Complex type 4 TAAA with right iliac artery aneurysm
Operative strategy

- Full heparinization
- Arterial cannulation in the femoral artery
- Femoral venous cannulation
- No CPB was required
- Proximal anastomosis first
- Bypass to the left renal artery
- Bypass to the left and right iliac arteries
Operative strategy

- Full heparinization
- Arterial cannulation in the graft
- Femoral venous cannulation
- Full CPB
- Distal anastomosis first (Aortic bifurcation)
- Distal aortic perfusion
- Selective renal and visceral perfusion
- Trifurcation graft
Type 1 TAAA

72 yo female

- Chronic type B aortic dissection
- Communication of the true and false lumen at the level of the SMA
Operative strategy

- Type 1 TAAA repair with 28 mm graft
- Reimplantation of T11 and T12 and celiac and SMA using bevel technique
- Femoral-femoral bypass
- DHCA
- Total body retrograde perfusion
- CSF drainage
Thoracoabdominal Aneurysms

2000–2015

Total Cases 230

male 141 61%
female 89 39%
Age 62 ± 13
Etiology: N=230

- Medial Degen.: 38%
- Ather.: 23%
- Chr. Diss. Acute Diss.: 27%
- Other: 9%
Presentation: N=230

- Elective: 66%
- Rupture: 19%
- Urgent: 15%
Aneurysm Type: N = 230

- Type I: 36%
- Type II: 20%
- Type III: 23%
- Type IV: 21%
Distal Perfusion

- No Distal perfusion: 13%
- Femoral-Femoral: 40%
- Atrial-Femoral: 47%
- DHCA: 19%
### Operative variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
<th>Range</th>
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<tbody>
<tr>
<td>Aortic X time</td>
<td>53</td>
<td>(19-143)</td>
</tr>
<tr>
<td>CPB time</td>
<td>87</td>
<td>(17-320)</td>
</tr>
<tr>
<td>DHCA time</td>
<td>31</td>
<td>(22-56)</td>
</tr>
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</table>
## Mortality and Morbidity

<table>
<thead>
<tr>
<th>Condition</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality</td>
<td>19</td>
<td>8.4%</td>
</tr>
<tr>
<td>Paraplegia</td>
<td>1</td>
<td>0.4%</td>
</tr>
</tbody>
</table>
Operative Complications

Post-Op Bleeding 8 3%

Stroke 8 3.5%
  - Embolic 3
  - Hemorrhage 3
### New Onset Renal Complications: Cr > 2.5

<table>
<thead>
<tr>
<th>Condition</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>New onset renal insufficiency</td>
<td>51</td>
<td>22%</td>
</tr>
<tr>
<td>New Onset Hemodialysis</td>
<td>8</td>
<td>3.5%</td>
</tr>
<tr>
<td>Ventilation &gt; 48h</td>
<td>51</td>
<td>22%</td>
</tr>
</tbody>
</table>
Hospital Stay

Mean  12 d

Range  (5-96)
Survival
Thank you
Open Surgical Treatment

- Extensive Operations
- Frequent need of DHCA
- Risk of Paraplegia
- Post-operative Mortality and Morbidity

<table>
<thead>
<tr>
<th></th>
<th>Open Repair N=12,573</th>
<th>TEVAR N=2,732</th>
<th>P Value</th>
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<tbody>
<tr>
<td>Mortality</td>
<td>7.1%</td>
<td>6.1%</td>
<td>p=0.07</td>
</tr>
<tr>
<td>Ruptured TAAA Mortality</td>
<td>46%</td>
<td>28%</td>
<td>p&lt;0.0001</td>
</tr>
<tr>
<td>1 year Survival for intact TAAA</td>
<td>82%</td>
<td>87%</td>
<td>p=0.001</td>
</tr>
<tr>
<td>5 year Survival for intact TAAA</td>
<td>62%</td>
<td>72%</td>
<td>p=0.001</td>
</tr>
</tbody>
</table>
Longevity of one year survivors (Open)

1 year mortality 22%  
23/104 patients

Observed and expected deaths for 81 patients alive one year after surgical repair of chronic distal dissection

<table>
<thead>
<tr>
<th></th>
<th>observed</th>
<th>expected*</th>
<th>ratio</th>
<th>p</th>
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<tbody>
<tr>
<td></td>
<td>14</td>
<td>10.17</td>
<td>1.38</td>
<td>0.23</td>
</tr>
</tbody>
</table>

#Linearized Death Rate: 2.80% per patient/year  
*Expected deaths based on NY State 2001 life tables

- Kaplan Meier survival curve
- NYS age and sex-matched population

Zoli, Ann Thor Surg 2010
Propensity-Matched Survival Following Thoracic Aneurysm Repair

Goodney, Circulation 2011
Survival Following Thoracic Aneurysm Repair

Adjusted analyses representing male, non-black patients under age 75, with Charlson score < 2, performed after 2003.
Freedom from Reintervention

- Proportion
- Months
- At Risk

Consensus Document

REPORT FROM THE SOCIETY OF THORACIC SURGEONS ENDOVASCULAR SURGERY TASK FORCE

Expert Consensus Document on the Treatment of Descending Thoracic Aortic Disease Using Endovascular Stent-Grafts*

Editors: Lars G. Svensson, MD, PhD, Nicholas T. Kouchoukos, MD, and D. Craig Miller, MD

Section Authors: Joseph E. Bavaria, MD, Joseph S. Coselli, MD, Michael A. Curi, MD, MPA, Holger Eggebrecht, MD, John A. Elefteriades, MD, Raimund Erbel, MD, Thomas G. Gleason, MD, Bruce W. Lytle, MD, R. Scott Mitchell, MD, Christoph A. Nienaber, MD, Eric E. Roselli, MD, Hazim J. Safi, MD, Richard J. Shemin, MD, Gregorio A. Sicard, MD, Thoralf M. Sundt III, MD, Wilson Y. Szeto, MD, and Grayson H. Wheatley III, MD

Ann Thorac Surg 2008;85:S1–41
Conclusion

• TEVAR have worse long-term survival

• Higher risk patients are being offered TEVAR

• Some patients do not benefit based on long-term survival

• Future work is needed to identify TEVAR candidates
The role of stent-grafting for patients with *chronic dissections* present for more than 8 weeks after the acute event *is still uncertain.*

*Open* surgical graft replacement *is likely to be a better option* particularly in *young, good-risk patients*
• Is it reasonable to search for a single segmental artery whose preservation will prevent paraplegia?  NO

• Is it reasonable to monitor spinal cord integrity in the perioperative period and treat cord ischemia when it occurs?  YES

• Do we yet have a strategy to assure preservation of spinal cord integrity through the perioperative period of thoracic and thoracoabdominal aortic aneurysm resection?  NO

• Has the neurological outcome of thoracic and thoracoabdominal aortic surgery improved markedly in the past decade?  YES
Case Presentation
Hybrid Procedure

78 yo male

• Aortic Arch Aneurysm
• CAD
Procedure

- Aortic Arch Debranching
- Trifurcation graft
- Bypass to:
  - Brachiocephalic
  - Left Carotid
  - Left Subclavian
- Stent placement from zone 0 to mid-descending thoracic aorta
- CABGx2 with SVG to LAD and First Diagonal
Case presentation

• 42 yo patient

• Distal Arch/ Type I TAAA
Visceral Perfusion

• Blood (from cardioplegia line)

• Rate at 200-300 cc/min
Case Presentation

• 67 yr old patient

• Type IV TAAA

• Previous Descending TA repair

• Symptomatic
Celiac Axis
R Renal
Iliac Bifurcation
Case Presentation

• 55 yo female
• Multiple strokes
• Severe Aortic Insufficiency
• Grade V ascending, arch, descending
• Severe stenosis celiac, SMA, R and L renal arteries
• AV replacement
• ArchReplacement
• Trifurcation graft to Brachiocephalic, Left Carotid and Left Subclavian arteries
• Stage 1 ET

First Operation
October 2014
Second Operation
July 2015

- Stage 2 ET
- Replacement of the descending thoracic aorta
- Reattachment with separate grafts
  - Celiac
  - SMA
  - Right and left renal arteries
Hybrid repair of Thoracic Aortic Aneurysm
Case Presentation

68 yo male

- Chest and back pain
- Chronic Type B dissection with a large false lumen extending to arch
Past History

- S/p stent placement in descending aorta
- S/p Ascending aortic dissection repair
- CHF
- Biventricular pacemaker
Preoperative diagnosis

• Aortic arch aneurysm
• Ascending thoracic aortic aneurysm
• Chronic Aortic Dissection
• s/p repair of type A aortic dissection
• s/p redo repair of Ascending Aorta pseudoaneurysm.
Preoperative CT scan
Preoperative CT scan
Postoperative CT scan
Postoperative CT scan