Hypoplastic Left Heart Syndrome: Interdigitating Arch Reconstruction

AATS Congenital Skills Course
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HLHS Arch

- Anatomic Goals for Arch Reconstruction
  - Unobstructed Arch and Head Vessels
    - Just “big” enough
  - Good Coronary Blood Flow
  - Adequate room for Left Pulmonary Artery
  - Adequate room for Trachea and left Bronchus
  - Competent neo-aortic Valve
  - Laminar tapered reconstruction

- Reconstruction in Safe amount of Time
Why is it Important?

• Norwood Autopsy Data
• 122 Autopsies – ’80-’95

  – Coronary perfusion - 27%
  – Excessive pulmonary flow – 17%
  – Neo- aortic obstruction – 14%
  – RV failure – 13%

Bartram, Grunenfelder, Van Praagh Ann Thorac Surg 1997;64:1795
Arch Reconstruction Techniques

- Classic
- Coarctation Resection
  - Autologous
  - Interdigitating
- Other
Classic Arch Reconstruction

Up to 1/3 can have recoarctation

Autologous - Mee, Brawn

Autologous - Mee, Brawn
Autologous and Interdigitating techniques

Residual Ductal Ring

Arch Patch

Patch

Split Potential Residual Ductal Tissue

Side to Side V Anastomosis Aorta and PA

Burkhart H. M. ….Van Arsdell et al.; J TCS 2005;130:61-65
Incisions Details

Backwall incision to 1st intercostal

Anterolateral Incision ≥ diameter of descending aorta
Arch Stenosis

Autologous (14%)

Classic Arch (33%)

“Interdigitating” (0%)

P=0.01

Over 100 Pts (<1%)

Burkhart H. M. ....Van Arsdell et al.; JTCS 2005;130:61-65
AortoPulmonary Window Size and Shunt Position

Favourable

Unfavourable
## Arch Measurements

|                           | Classic  
<table>
<thead>
<tr>
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<tbody>
<tr>
<td></td>
<td>N=26</td>
</tr>
<tr>
<td>Asc Ao</td>
<td>18.5</td>
</tr>
<tr>
<td>T Arch</td>
<td>15.3</td>
</tr>
<tr>
<td>Arch at SubClvn</td>
<td>11.2</td>
</tr>
<tr>
<td>Distal arch Anastamosis</td>
<td>7.2</td>
</tr>
<tr>
<td>Desc Ao</td>
<td>10.6</td>
</tr>
</tbody>
</table>
|                           | Autologous  
|                           | n=20    |
| Asc Ao                    | 14.9    |
| T Arch                    | 11.8    |
| Arch at SubClvn           | 9.6     |
| Distal arch Anastamosis   | 7.3     |
| Desc Ao                   | 8.1     |
|                           | Interdigitating  
|                           | n=33    |
| Asc Ao                    | 16.8    |
| T Arch                    | 14.6    |
| Arch at SubClvn           | 11.1    |
| Distal arch Anastamosis   | 8.4     |
| Desc Ao                   | 7.8     |
|                           | p       |
| Asc Ao                    | .0086   |
| T Arch                    | .0029   |
| Arch at SubClvn           | .0493   |
| Distal arch Anastamosis   | .088    |
| Desc Ao                   | <0.0007 |
Interdigitating Arch Reconstruction
Arch Appearance – HLHS

Favourable

Unfavourable
V Anastamosis
Small Ascending Aorta
Arch Appearance – Tricuspid Atresia/TGA

Favourable

Unfavourable
Late Problems

11 cm Ascending Aorta

Stented Coarctation
Autologous and Interdigitating techniques

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Summary

Resect Coarctation

Leave Room for LPA

Incisions across the ductal ring reduce ‘residual’ ductal issues

<1% re-coarctation