Routine Leaflet Augmentation in the Repair of CAVSD

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• The outcome of repair of complete AVSD is dependent on multiple factors such as:
  – The morphology of the lesion
  – Technique of repair
  – Perioperative care
• A better understanding of the morphology of CAVSD has impacted the outcome
Septum

Conduction system

valves
I - Septal lesions

- ASD premium
- VSD Inlet
• Decrease distance inlet-apex
• Increase distance apex-outlet
• Aortic valve is elevated and deviated anteriorly
• LVOT narrowed, but rarely hemodynamically significant “gooseneck” LVOT
What is a Successful operation?

• surgical repair is directed towards:
  1. closure of ASD, VSD
  2. avoidance of damage to the AV node and bundle of His
  3. maintenance or creation of two competent, non-stenotic AV valves
Evaluation

- CAVSD
  - ASD
  - VSD
  - LV
    - size
    - Papillary muscle
  - LAVV
    - cleft
    - Place chordae
CAVSD Repair

• Single patch with leaflet division
• Double patch with leaflet preservation
• Single atrial patch with no VSD patch (Australian)
Single Patch Technique
VSD Closure

Double Patch Technique
LAW Repair Techniques

- complete closure of “cleft” is recommended
- primary valve replacement should be avoided
- To prevent postoperative LVOTO
  – adequate sizing of interventricular patch
  – abnormal chordae to left-sided outlet septum
  – accessory valve tissue in outflow tract
LAW repair techniques
Single Papillary Muscle

Parachute mitral valve

Valve composed of anterior and posterior leaflet without lateral i.e. bicuspid.

Split the muscle as far as possible.
With partial closure of cleft on Hegar
Double orifice AV valve.

- Partial Closure of cleft with measurement
ASD Closure
Intermediate Form

- ASD + VSD (Small)
- Common AVV
- Chordae attach to base of the cleft which lead to restricted leaflet motion
Evaluation of common techniques

• The single patch allows for good exposure under the bridging leaflets but leaves both valves at the same level and limits the repairability of the left AV valve

• The double patch allows less distortion of the leaflet but exposure is compromised

• Elimination of the VSD patch may cause narrowing of the LVOT
• All techniques do not address the deficient leaflet issue which may result in post operative LAVV regurgitation
Modified Operative Technique

- Rt atriotomy, inspection of the defect and evaluation of the common AV valve
- Both superior and inferior bridging leaflet are divided with inspection of the chordal attachment
- A patch of fresh autologus pericardium is accurately shaped
- The ventricular component is attached to the crest of the ventricular septum
Modified Operative Technique 2

- The free edge is attached to the divided left AV valve leaflet at the same time approximating the base of the cleft
- The cleft is then closed
- The LAVV is tested
- The atrial patch is attached 3-5mm away from the edge of the VSD patch together with approximating the RAVV. This part allows for better coaptation of the LAVV
- RA is then closed
## Results

From Jul 2000- Dec 2010

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. Of children</td>
<td>148</td>
</tr>
<tr>
<td>Mean age (mos)</td>
<td>9 ± 1.5</td>
</tr>
<tr>
<td>Median age (mos)</td>
<td>5.7</td>
</tr>
<tr>
<td>Mean wt. (Kg)</td>
<td>6.7 ± 0.8</td>
</tr>
<tr>
<td>Pre-op banding</td>
<td>1</td>
</tr>
<tr>
<td>Transitional type</td>
<td>15</td>
</tr>
<tr>
<td>Coarcatation repair without banding</td>
<td>3</td>
</tr>
<tr>
<td>Associated TOF/DORV</td>
<td>13</td>
</tr>
<tr>
<td>DOLAVV</td>
<td>2</td>
</tr>
<tr>
<td>Parachute LAVV</td>
<td>4</td>
</tr>
</tbody>
</table>
Amount Of AVSD’s Per Year

- 2000: 7
- 2001: 7
- 2002: 15
- 2003: 20
- 2004: 18
- 2005: 18
- 2006: 25
- 2007: 15
- 2008: 15
- 2009: 16
- 2010: 8
Age At Surgery

- 78 patients were aged 111 years old.
- 57 patients were aged 11 years old.
- 12 patients were aged 2 years old.
- 4 patients were aged 3 years old.
- 2 patients were aged 4 years old.
- 1 patient was aged 5 years old.
- 1 patient was aged 6 years old.
- 1 patient was aged 7 years old.
- 2 patients were aged 8 years old.
- 1 patient was aged 10 years old.
- 1 patient was aged 11 years old.
- 1 patient was aged 13 years old.
Mean = 181.14
Std. Dev. = 66.591
N = 135
Down’s Syndrome vs - Non Downs’

Percentage

70

30

Down’s

Non Down’s
Results

• Type of VSD Pacth
  – Gortex (PTFE) 5
  – Fresh autologus pericardium 143

• Atrial patch autologus pericardium 148

• Additional LAVV repair 35%

• TPT 85±24

• Ischemic time 63±17
Other Procedures During repair

- BTS Takedown 3
- Coarctation 3
- DORV Repair 4
- Cor Triatriatum Repair 1
- Pulmonary Artery DeBand 1
- Pulmonary Venous Stenosis Repair 1
- Right Ventricle Outflow Tract Procedure 5
- Right Ventricle Overhaul 15
- TOF Transannular Patch 10
- Baffle of LSVC to RA
Results

- Ventilatory support (days)    \(2 \pm 1\)
- LCO                         \(8\)
- Renal failure requiring dialysis \(2\)
- ECMO support                \(2\)
- Hospital stay              \(10 \pm 5\)
- Early mortality           \(1 \ (0.7\%)\)
Further Surgeries Required

• Early
  – Coarctation repair 1
  – AVV Repair 1
  – Permanent Pacemaker 1

• Late
  – AVV Repair 6 (4%)
  – Mitral Valve Replacement 2 (1.3%)
  – PPM 1
  – PA stenting 1
# Results

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Follow up (mos)</td>
<td>55</td>
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<tr>
<td>Late mortality</td>
<td>2</td>
</tr>
<tr>
<td>Aneurysm of the VSD patch</td>
<td>1</td>
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</table>
Echocardiographic Results

- Last post operative LAVV regurgitation by TTE (24 lost to follow up)
  - None or trace: 90
  - Mild: 22
  - Moderate: 11
  - Severe: 2
Echocardiographic Results

- Residual VSD 1
- Subaortic gradient 0
- Clear evidence of LAVV augmentation by the modified technique
• Between 1975 and 2006, 312 patients underwent surgery for:
  – complete AVSD (n 209; 67.0%),
  – partial AVSD (n 76; 24.4%),
  – or intermediate AVSD (n 27; 8.6%).
• Mean age was 2.4 +/- 3.9 years;
• 142 patients (45.5%) were younger than 6 months.
• Follow-up was 99.0% complete.
• 26 in-hospital deaths (8.3%)
• 6 late deaths (2.1% of 283).
• Of the hospital survivors, 43 (14%) patients required a late reoperation.
Methods

• Between April 1997 and April 2007, 93 consecutive patients underwent surgery for biventricular correction of AVSD

• Median age of 5.8 months (range, 9 days to 68.9 years).

• Fifty-three patients had complete AVSD,

• 6 patients had an intermediate type,

• 29 patients had partial AVSD;

• 4 patients had a complete AVSD with associated tetralogy of Fallot,

• 1 patient had a complete AVSD with double-outlet right ventricle.
Primary Biventricular Repair of Atrioventricular Septal Defects: An Analysis of Reoperations

Hunaid A. Vohra, FRCS (CTh), Alicia X.F. Chia, MB BS, Ho Ming Yuen, BS, Joseph J. Vettukattil, MRCP, Gruschen Veldtman, MRCP, James Gnanapragasam, FRCP, Kevin Roman, MRCP, Anthony P. Salmon, FRCP, and Marcus P. Haw, FRCS (CTh)

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- There was no in-hospital mortality.
- There were 2 late deaths (2.2%).
- Forty-three reoperations were performed in 23 patients (24.7%),
  - 18 were for repair of significant left atrioventricular valve regurgitation
  - 8 were mitral valve replacements.
- Seven patients (7.5%) required insertion of a permanent pacemaker.
Conclusions

- Repair of AVSD depends on thorough knowledge and evaluation of morphologic substrate
- The use of this modified technique yields good results
- This technique allows for good exposure, good LAVV reconstruction and close to anatomical repair
- The technique is in particular beneficial in deficient leaflet tissue and may decrease the incidence of complete heart block
- This repair can be performed early in life with good results