Transcatheter Heart Valves
A Hybrid Approach…
Let’s Work Together

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Disclosures

• As a faculty member of 8th National ACHA Conference, I have the following disclosures:
  – Medtronic
    • Consultant, P.I., Proctor
  – NuMED, Inc
    • Consultant, P.I., Proctor
  – Beijing Med-Zenith Medical Scientific Co
    • Consultant, Research Grant, P.I., Proctor
Acknowledgements

• Evan Zahn, MD: MCH before CSMC
• Sitaram Emani, MD: BCH
• Mario Carminati, MD: San Donato Milan
NCH Experience: THV

- From July, 2008 – February, 2017
- 207 TPV in 192 patients + 6 lambs
  - 179 Melody TPV
  - 11 Edwards Sapien
  - 11 Harmony TPV
- RV – PA Conduits (142)
  - 11 in conduits < 16mm
- Bioprosthetic Valves (27)
  - Pulmonary (16)
  - Tricuspid (5)
  - Aortic (2)
  - Mitral (4)
- Native RVOT (27)
  - 16 Melody/Sapien
  - 11 Harmony
- PA branches with native RVOT (5)
- Med-Zenith PT-Valve (6 lambs)
- Hybrid per-ventricular/per-atrial implant (8)
Hybrid Delivery of Transcatheter Heart Valves

• Sometimes an alternative to transvenous-arterial delivery of the THV may be necessary
  – In the RVOT, TV position
  – In the mitral valve position
  – In the aortic valve position
• It may be because you can’t deliver it any other way
• It may be because of the size of the patient or conduit
• It may be because you are worried it won’t work…the surgeon is already in attendance
• It may be performed on or off cardiopulmonary bypass
Possible Sites for Hybrid Procedures

- Pulmonary Valve
- Aortic Valve
- Tricuspid Valve
- Mitral Valve
Can’t Get There

- 30 y/o TOF with LAD from RCA
  - Waterston shunt
  - Pulmonary valvectomy
  - Rastelli-19mm homograft
  - 20mm homograft
  - 22mm Hancock
- V-tachy
- PS and PR (2 locations)
Surgeon to the Rescue

- After 8 hours and 6 stents (4 BMS & 2 CCPS & near miss embolization) …
Perventricular Delivery of Melody TPV on 22mm Ensemble
ICE Confirms Excellent TPV Function
Can Get There, But...

- 33 y/o PA/VSD
  - Rastelli with conduit
  - Multiple conduit changes
  - 26mm Hancock conduit
- V-tachy and AF
- ICD
- PS, PR, LPA stenosis
RFV Approach Tortuous
RIJV Approach after ICD...whoops!
Hybrid Perventricular Approach
Perventricular Melody TPV Implant
How Small Is Too Small?
Hybrid Perventricular Melody TPV @ MCH

Courtesy of Evan Zahn & Redmond Burke

Hybrid Melody Implant
4 kg infant
Miami Children's Hospital
Possible Sites for Hybrid Procedures

- Pulmonary Valve
- Aortic Valve
- Tricuspid Valve
- Mitral Valve
Aortic Angio Post Implant
“Modified” Melody to Allow Coronary Artery Flow
BCH
Possible Sites for Hybrid Procedures

- Pulmonary Valve
- Aortic Valve
- Tricuspid Valve
- Mitral Valve
Concept of an Expandable Valve for Surgical Implantation in Infants and Children

Sitaram Emani, Breanna Piekarski, David Zurakowski, Christopher Baird, Gerald Marx, Audrey Marshall, Pedro J. del Nido

Boston Children’s Hospital

OFF Label use of Melody® valve device
Techniques of Implantation

- Mitral, Tricuspid Aortic
- RVOT
  - End to end vs. within graft
- Stent modification
- Intraoperative balloon expansion median 14 mm
- Acute valve dysfunction in N=2 – excessive trimming
Melody Location / Indications

- RVOT: 1
- Mitral: 24
- Aortic: 3
- Tricuspid: 14
Melody implantation for mitral valve replacement in children

Policlinico San Donato IRCCS
(March 2014 - July 2016)

9 Pts
age: 3 m.- 6 y.
weight: 4 - 23 Kg.
Fixation of distal stent to inferior LV wall.
<table>
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<tr>
<th>Modality</th>
<th>Parameters</th>
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<tr>
<td>TEE</td>
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<td>X7-2t</td>
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**Additional Information:**

- T. Paz: 37.0 °C
- T. TEE: 39.5 °C

**Legend:**

- 2D: Two-dimensional imaging
- Zoom HD: High-definition zooming capability
- VR: View rate (10 Hz)
- Gen.: General settings
- Grad.: Gradient level
- C: Contrast level
- 4/4/0: Frame rate
- 50 mm/s: Frame rate
Patrick McConnell, MD, from the Cardiothoracic Surgical Department at NCH has championed the use of CorMatrix in the repair of and the replacement of cardiac valves.

How To Make A CorMatrix Valve
Hybrid Melody MVR on CPB @ NCH

• Former 2 kg premie with MS/MR
  – Had 2 ply 13mm CorMatrix MVR at 2 mo/old
• Required balloon MV at 8 mo/old
  – Mean 28mmHg gradient decreased to 10mmHg
• Recurrent MVS at 10 mo/old
  – Mean 20mmHg gradient
• Hybrid modified (2 rows folded back) Melody on 12mm BIB, redilated to 14mm on CPB
Hybrid Melody MVR on CPB
“Folded Melody” on 12mm BIB
Hybrid Melody MVR on CPB
Redilated on 14mm Z-med
Hybrid Melody MVR on CPB

Post Implant TEE: No MR, mean 5mmHg gradient
5 months s/p Melody MVR: No MR, Mild MS
Hybrid Transcatheter Heart Valves

• CONCLUSIONS

– Because of perventricular/peratrial delivery off and on CPB, all cardiac valves will be “fair game”, regardless of patient size or complexity of lesion…it just takes innovation & imagination

– Involving your CT surgical team in transcatheter heart valve therapies is critical to the ultimate success of the procedure
THANK YOU

Willa  Olivia

Eli    Stella

Mya    Cooper