ΥΒΡΙΔΙΚΕΣ ΠΡΟΣΠΕΛΑΣΕΙΣ ΚΑΙ Ο ΡΟΛΟΣ ΤΟΥ ΕΠΕΜΒΑΤΙΚΟΥ ΚΑΡΔΙΟΛΟΓΟΥ ΣΤΗ ΧΕΙΡΟΥΡΓΙΚΗ ΣΥΓΓΕΝΩΝ ΚΑΡΔΙΟΠΑΘΕΙΩΝ

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1. CHD is the most common congenital anomaly and cardiac disease is the most common cause of death in infants and children

2. Progress in CHD surgery has increased the pool of complex and multi-operated patients

3. Repetitive surgical trauma and bypass may affect the outcome of patients

4. Percutaneous interventions may be associated with an increased risk due to occluded vessels or vascular access small for the purpose.

Combining operative and interventional approaches with direct puncture of the heart or the great vessels may facilitate completing the procedure and implanting large devices and stents.
Hybrid procedures

1972: First combined hybrid procedure by Bhati et al

1. Introduced in the settings where routine cardiac surgery or cardiac interventions would not bring satisfactory results

2. Hybrid procedures in children and adults with congenital heart defects combine the experience of cardiac surgery and interventional cardiology as each technique has its own limitations, which could impair the anticipated result

3. Additional alternative option for selected group of borderline patients

4. Hybrid procedures shorten cardiopulmonary bypass, reduce morbidity of surgery and reduce duration of stay in the intensive care unit and the hospital

Hybrid procedures in adults with Congenital Heart Disease

1. Multi-operated patients
2. Inability to go on bypass
3. Co-morbidities
4. Severe lung disease
5. Poor cardiac function
5. Haematological disorders etc.
Hybrid procedures in Adults with Congenital Heart Disease

1. Implantation of transcatheter valves (pulmonary / tricuspid / mitral)
2. Transapical Paravalvular Leak Closure
3. Hybrid Branch Pulmonary artery or aortic stenting
4. Per-ventricular VSD closure
5. Large artery stenting, ie venous baffles etc
Hybrid implantation of pulmonary valve in extremely dilated RV / MPA with poor function

A novel hybrid technique for transcatheter pulmonary valve implantation within a dilated native right ventricular outflow tract

Frances C. Travelli, MD, Cynthia S. Herrington, MD, Frank F. Ing, MD

The Journal of Thoracic and Cardiovascular Surgery
Volume 148, Issue 2, Pages e145-e146 (August 2014)
DOI: 10.1016/j.jtcvs.2014.04.046
Hybrid pulmonary artery plication followed by transcatheter pulmonary valve replacement: Comparison with surgical PVR
Sosnowski C. Catheter Cardiovasc Interv 2016
29-mm Edwards Sapien XT prosthesis within an Andramed AS43XXL stent implanted in the pulmonary position.

Rapetto F et al. Hybrid Surgery Options for Complex Clinical Scenarios in Adult Patients with Congenital Heart Disease, 2017
Simplified surgical-hybrid Melody® valve implantation for paediatric mitral valve disease

Michael Hofmann, Hitendu Dave, Michael Hübler and Oliver Kretschmar

Abstract

Children suffering from left atrioventricular valve (LAVV) disease not amenable to repair represent a significant challenge. The results of surgical reconstruction are not optimal. Valve replacement as an alternative is associated with poor results. The surgical-hybrid approach with implantation of a stented biological valve (bovine jugular vein graft, Melody® valve) seems to represent a new therapeutic option. Here we demonstrate our case, the consideration and the approach to extreme clinical findings in a small child. We describe a simplified surgical-hybrid Melody valve implantation in a LAVV position. The technique of implantation is relatively simple and the immediate postoperative result very good.

Keywords: Congenital mitral valve stenosis • Mitral valve replacement • Melody® valve implantation • Hybrid approach
Assessment of the Melody Valve in the Mitral Position in Young Children by Echocardiography

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Abstract

Objectives—Mitral valve replacement (MVR) in young children is limited by lack of small prostheses. Our institution began performing MVR with modified, surgically placed, stented jugular vein grafts (Melody valve) in 2010. We sought to describe key echocardiographic features for pre- and post-operative assessment of this novel form of MVR.

Methods—The pre- and post-operative echocardiograms of 24 patients who underwent Melody MVR were reviewed. In addition to standard measurements, pre-operative potential measurements of the mitral annulus were performed whereby dimensions were estimated for Melody sizing. A ratio of the narrowest subaortic region in systole to the actual mitral valve dimension (SubA:MV) was assessed for risk of post-operative left ventricular outflow tract obstruction (LVOTO).

Results—Melody MVR was performed at a median of 8.5 months (5.6 kg) for stenosis (5), regurgitation (3), and mixed disease (16). Pre-operatively, actual mitral z-scores measured hypoplastic (median −3.1 for the lateral (lat) dimension; −2.1 for the antero-posterior (AP) dimension). The potential measurements often had normal z-scores with fair correlation with intra-operative Melody dilation (p=0.51 and 0.50 for lat and AP dimensions, both p=0.01). A pre-operative SubA:MV <0.5 was associated with post-operative LVOTO, which occurred in four patients. Post-operatively, mitral gradients substantially improved, with low values relative to the effective orifice area of the Melody valve. No patients had significant regurgitation or perivalvar leak.

Conclusions—Pre-operative echocardiographic measurements may help guide intra-operative sizing for Melody MVR and identify patients at risk for post-operative LVOTO. Acute post-operative hemodynamic results were favorable; however, on-going assessment is warranted.
Trimming the Melody

Courtesy G Butera, Milan
Suture of pericardial cuff

Courtesy G Butera, Milan
Melody insertion

Courtesy G Butera, Milan
Balloon inflation

Courtesy G Butera, Milan
ASD closure leaving a fenestration

Courtesy G Butera, Milan
Results – Patient Characteristics

• 55 patients
  – Mitral (n= 50); Tricuspid (n= 5)

• Diagnosis
  – Congenital MS (n= 28)
  – Atrioventricular canal (n= 18)
  – Congenital MR (n= 7)
  – PA/IVS (n= 2)

Courtesy Dr Emani
Freedom from Valve Replacement

- Freedom from valve replacement was 93% at 12 months, and 77% at 24 months, excluding early deaths
- Median time was 18 months (range: 5-50 months)
- 7 of those with eventual replacement underwent BD

Kaplan-Meier Estimates (95% CI)
- 6 Months: 98% (96%-100%)
- 12 Months: 93% (87%-99%)
- 18 Months: 81% (70%-92%)
- 24 Months: 77% (64%-90%)
- 30 Months: 60% (52%-78%)

Number at Risk:
- 0: 48
- 3: 38
- 6: 33
- 9: 26
- 12: 22
- 18: 8

Months Post-Implantation

Courtesy Dr Emani
Williams CoA / AR: CoA Stent recoil

LV EF 36%
LVEDd: 143ml/m²
LPA occlusion: recanalisation post Fallot repair with Contegra conduit. **HYBRID APPROACH**
VSD closure
HYBRID APPROACH
Transcatheter closure of paravalvar leaks

DEVICES AVAILABLE

- Use of devices approved for closure of patent ductus arteriosus, ventricular septal defects, atrial septal defects, or nonspecific vessels or vascular anomalies.

- Several recent reports from outside the United States have highlighted the use of the Amplatzer Vascular Plug III for PVL closure, although on first glance the outcomes do not seem to differ markedly from various other devices that have been used.
Hybrid MV PVL closure
Amplatzer Vascular Plug II 12/9
Color Flow Evaluation

Baseline

Final Result
As disease complexity and patient age are increasing, the population suitable for hybrid procedures broadens.

- Hybrid procedures allow Surgeons and Cardiologists to achieve complex procedures that would not be possible in another way.
- Reduce the total number of interventions
- Avoid prolonged cardiopulmonary bypass
- Reduce total hospital stay, morbidity, mortality and cost
Thank you

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