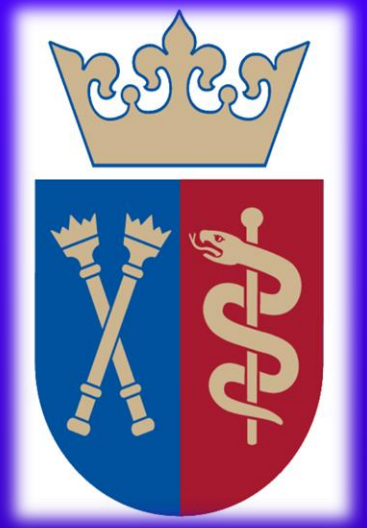
Strategies in the unrepairable AV valve



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Disclosures

- I have NO diclosures

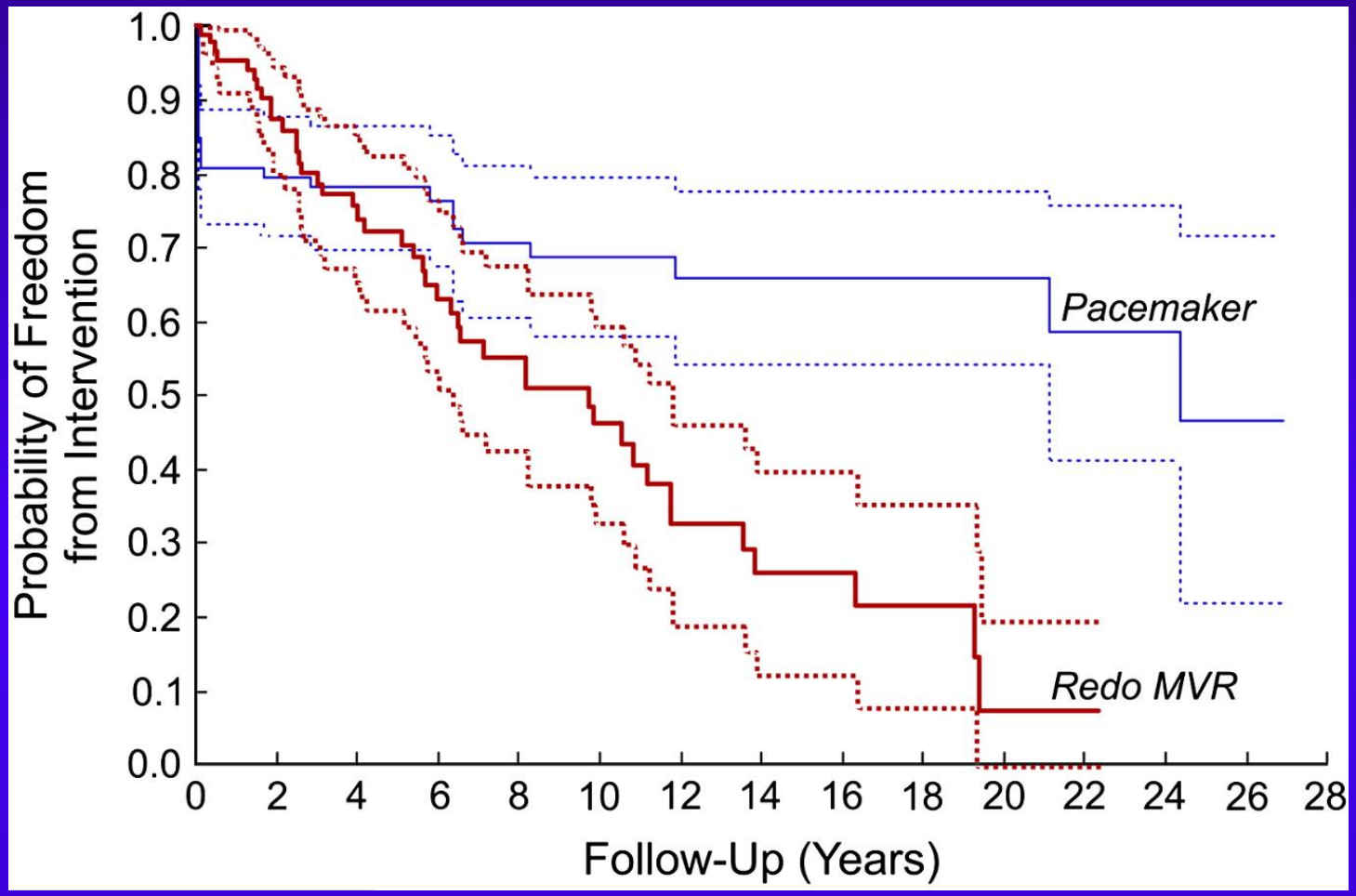
Scenarios

- Preoperative diagnosis
  - Prenatally diagnosed AV – canal with AVVR and circulatory failure
  - Small child, masive regurgitation of AV valve
  - Damage to the subvalvular apparatus, rupture of chordae tendineae, tinny, perforated or underdeveloped liflets
    - Endocarditis
    - KawasaKi disease
    - Maternally derived SSA Antibodies
- Intraoperative findings

Unrepairable A-V canal - another startegy?

"Nurse, get on the internet, go to SURGERY.COM, scroll down and click on the 'Are you totally lost?' icon."

Pediatric MVR



Mitral valve replacement in infants and children 5 years of age or younger: Evolution in practice and outcome over three decades with a focus on supra-annular prosthesis implantation

J Thorac Cardiovasc Surg. 2008 October ; 136(4): 954–961.

Options for unrepairable AV valve.

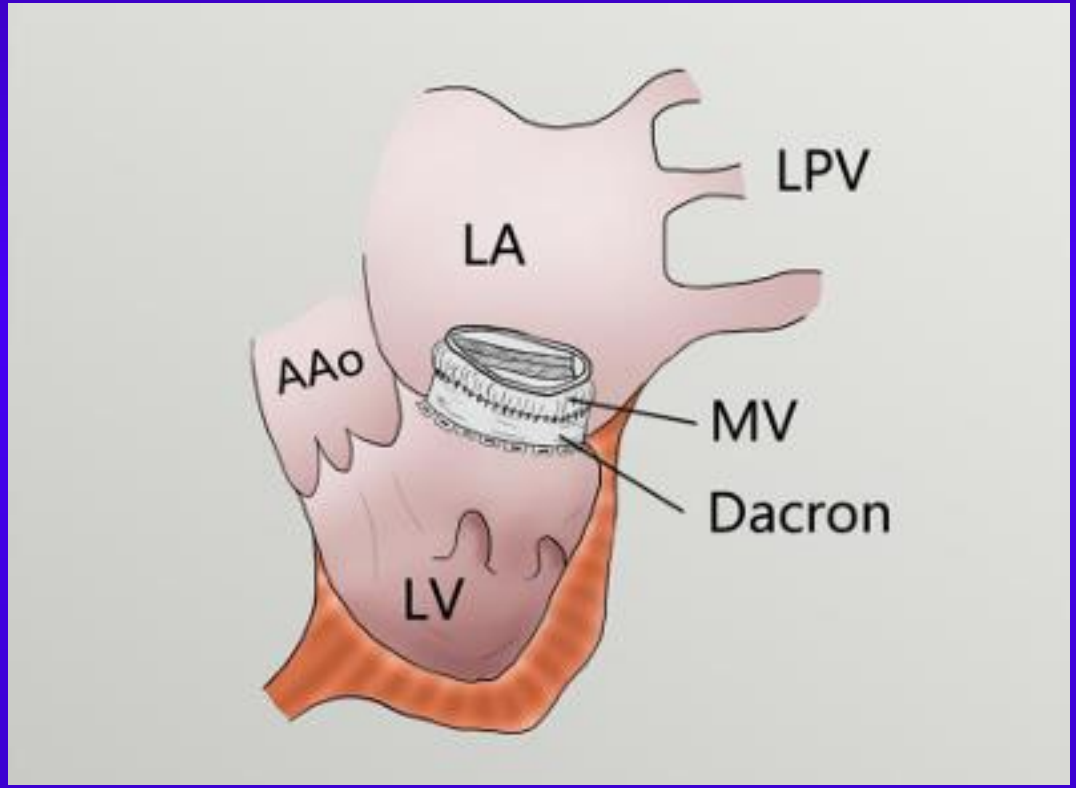
- Bioprostheses:
  - Hybrid implantation
    - Melody
    - Sapien 3
  - Surgical implantation:
    - Contegra graft
    - Hankock aortic valve
    - Hand-made valves
- Mechanical or artificial valves:
    - Mechanical prostheses
    - Hand made cylindrical valves

- Homogrfts:
  - cryopreserved mitral valve homografts

- Autografts:
  - Ross II operation

Mechanical prosthesis

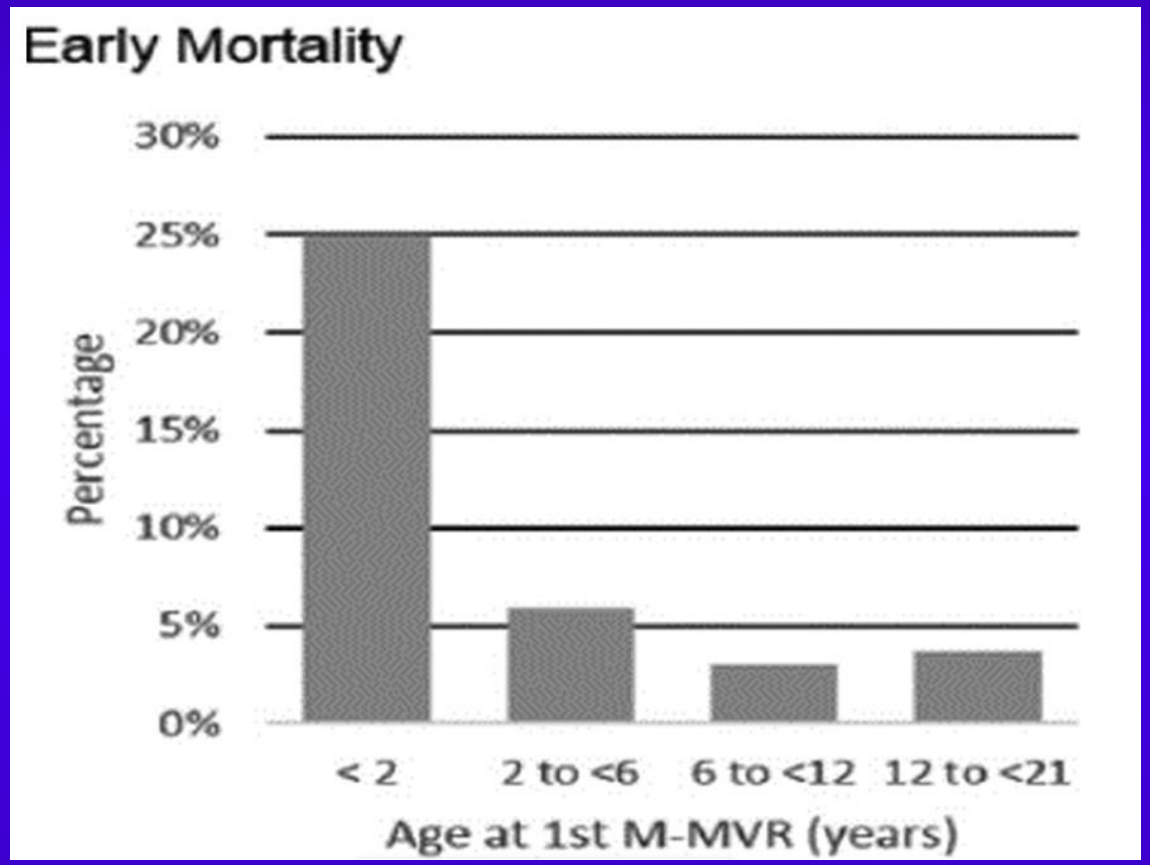
- The smallest - 15 mm bileaflet prosthesis

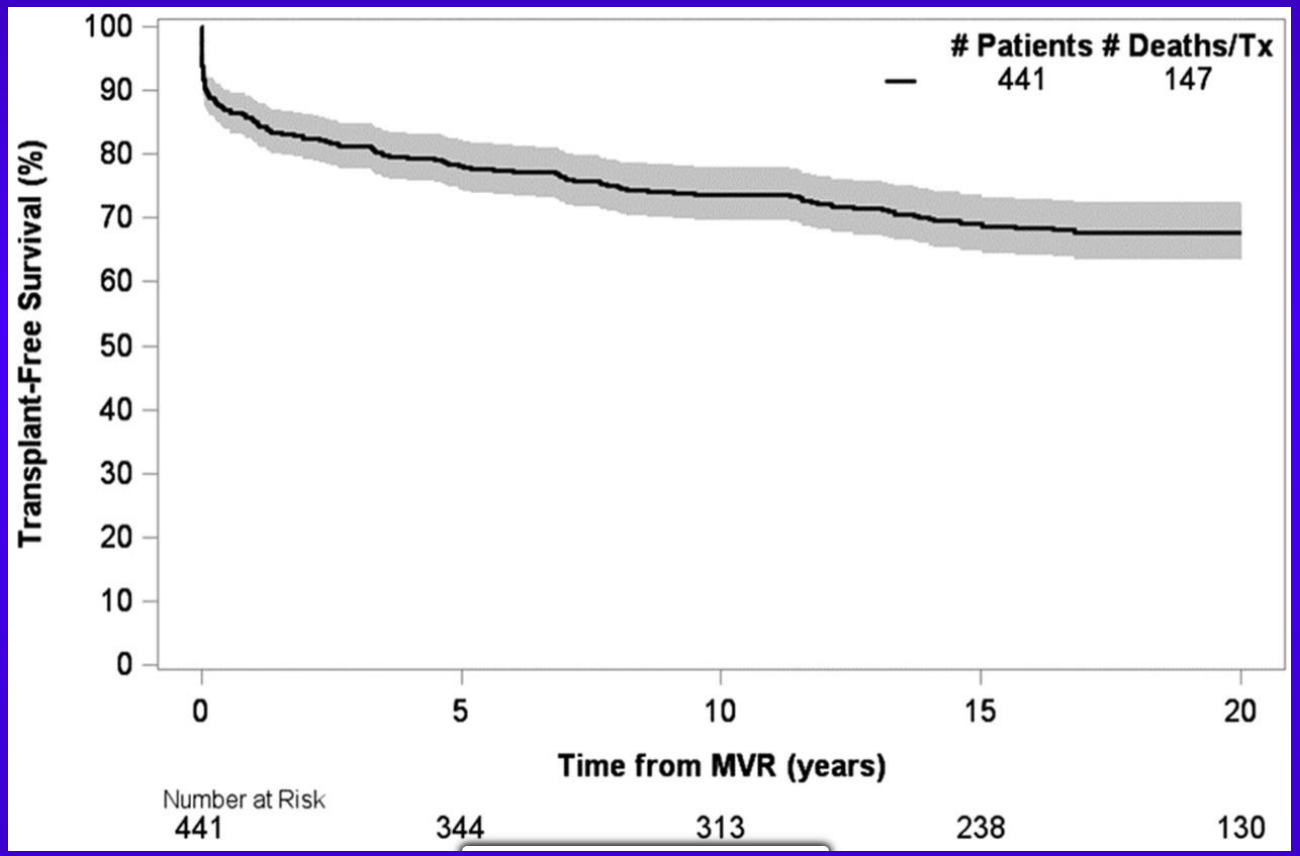


Long-term survival after mitral valve replacement in children aged <5 years: a multi-institutional study

C A Caldarone [1], G Raghuveer, C B Hills, D L Atkins, T L Burns, D M Behrendt, J H Moller

Multicenter Study > Circulation. 2001 Sep 18;104(12 Suppl 1):I143-7.





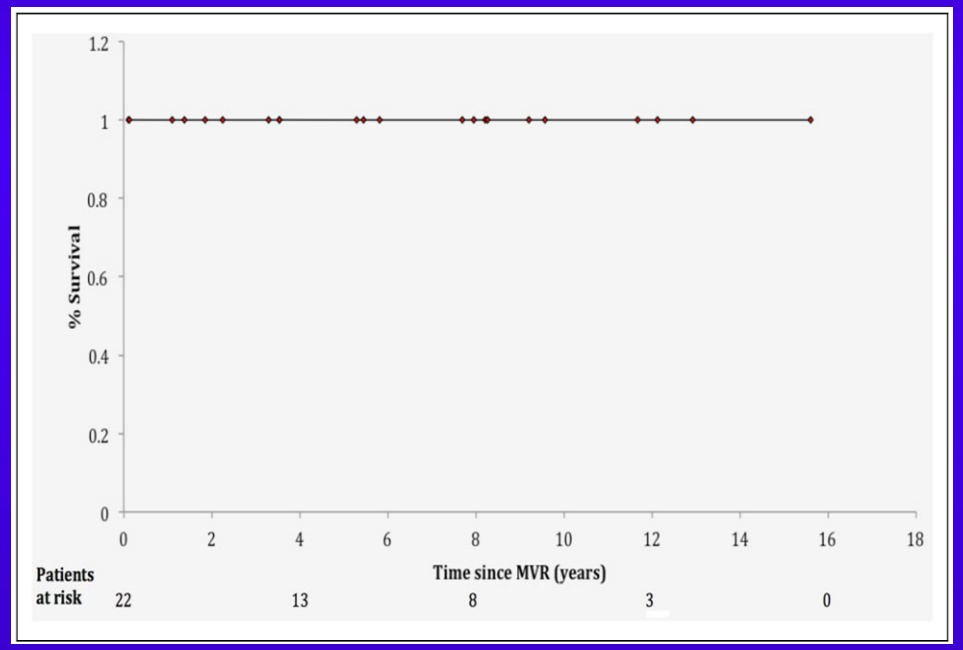
Original Article

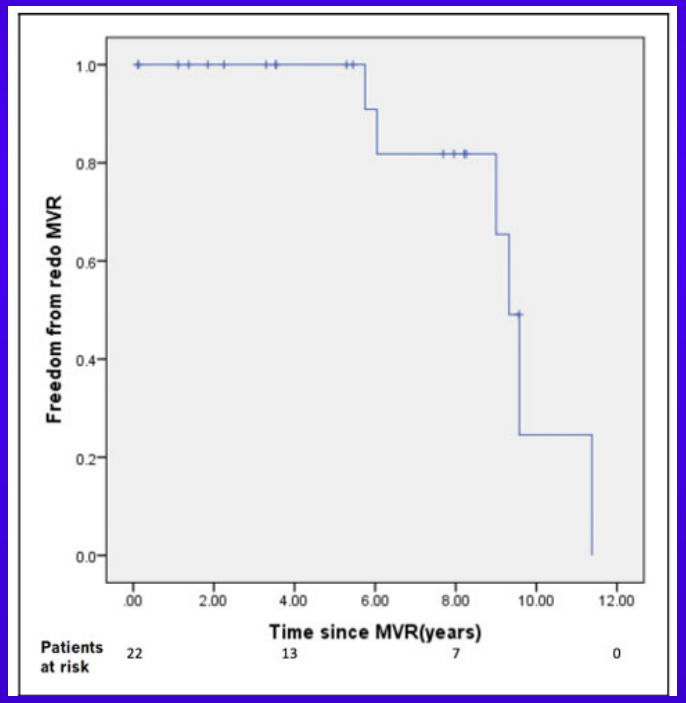
Patient-Specific Approach to Mitral Valve Replacement in Infants Weighing 10 kilograms or less

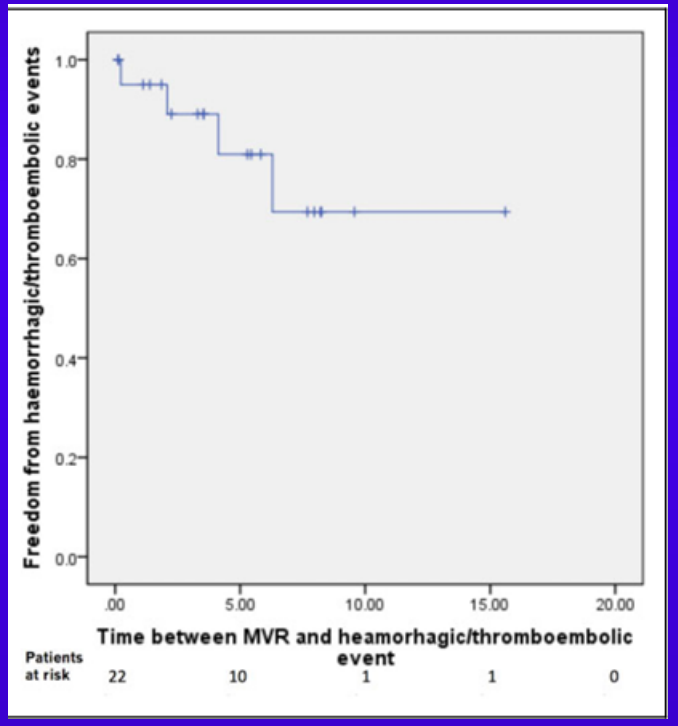
Kathryn Mater[1,*], Julian Ayer, FRACP, PhD[2], Ian Nicholson, MBBS, FRACS[2,3], David Winlaw, FRACS, MD[2,4], Richard Chard, MBBS, FRACS[2,3], and Yishay Orr, FRACS, PhD[2,3,4]

World Journal for Pediatric and Congenital Heart Surgery
2019, Vol. 10(3) 304-312

DOI: 10.1177/2150135119837200
journals.sagepub.com/home/pch
SAGE







Melody valve

Stented bovine jugular vein graft (Melody valve) for surgical mitral valve replacement in infants and children

Luis G. Quiñonez, MD,[a] Roger Breitbart, MD,[b] Wayne Tworetsky, MD,[b] James E. Lock, MD,[b] Audrey C. Marshall, MD,[b] and Sitaram M. Emani, MD[a]

Objective: The options for mitral valve replacement in children with irreparable mitral valve disease have been limited to fixed-diameter prostheses that do not accommodate for somatic growth. We have modified an externally stented bovine jugular vein graft (Melody valve) for implantation in this cohort. Because it is not a fixed-diameter prosthesis, we hypothesized that the valve can be expanded in the catheterization laboratory as the child grows.

Methods: The medical records of patients who had undergone Melody valve implantation in the mitral or left atrioventricular valve position from 2010 to 2013 were reviewed.

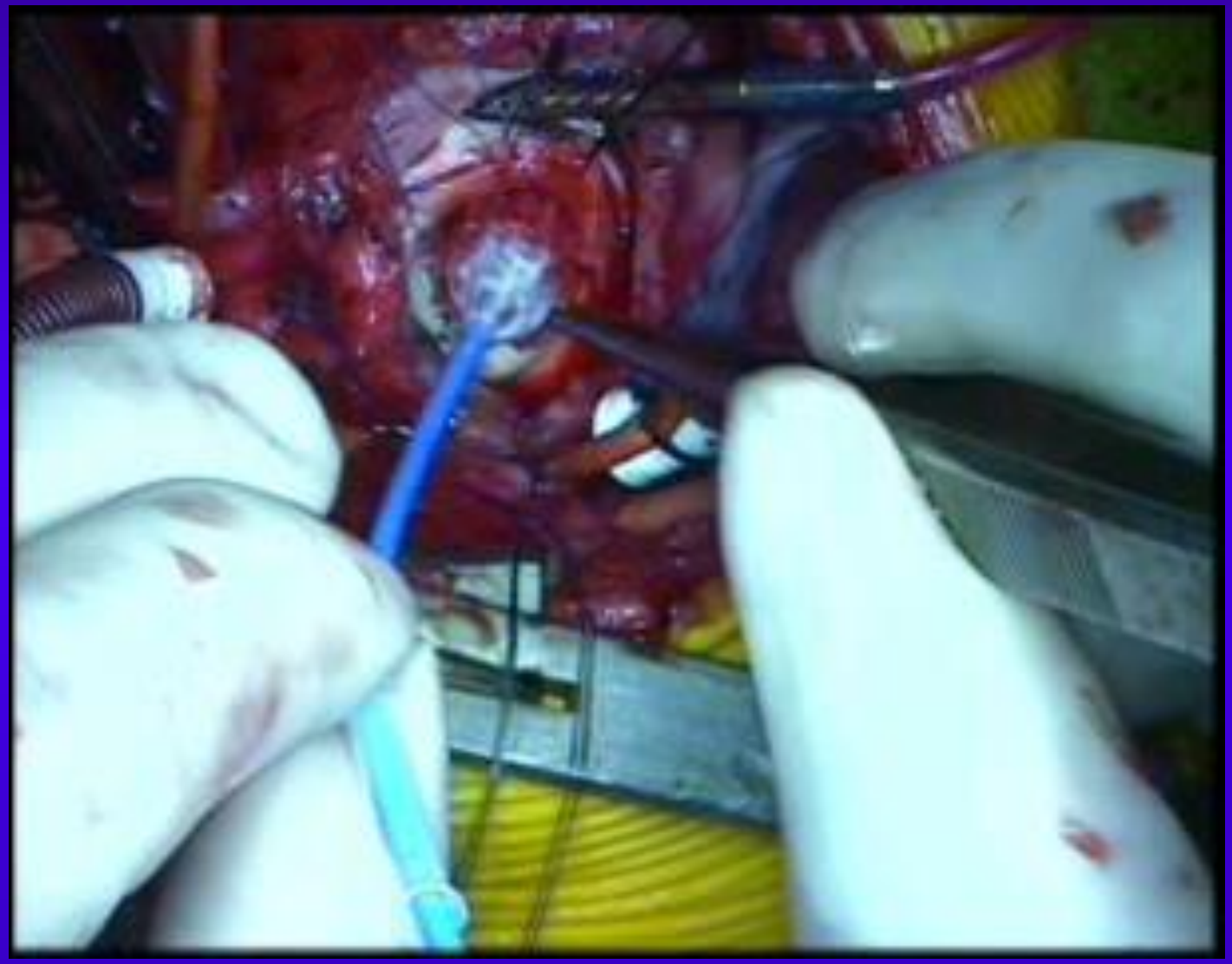
Results: Eleven patients had undergone Melody valve implantation at a median age of 7 months (range, 2-28). The techniques of valve modification and implantation included stent shortening, adding a pericardial sewing cuff, intraoperative balloon expansion, and fixation of the distal stent to the inferior left ventricle wall. The valve was competent, with a low gradient acutely postoperatively in all patients. One patient died, and one required permanent pacemaker implantation. One patient developed valve dysfunction and required explantation. Two patients without a pericardial sewing cuff developed paravalvular leaks. One patient who had not undergone distal stent fixation developed left ventricular outflow tract obstruction. Three patients who had undergone subsequent catheter-based balloon expansion of the valve have continued to demonstrate acceptable valvular function.

Conclusions: The Melody valve has demonstrated acceptable short-term function. Implantation techniques to prevent left ventricular outflow tract obstruction (suture fixation of the distal stent) and paravalvular leaks (the addition of a pericardial cuff) should be considered. The Melody valve can be percutaneously expanded as the child grows. (J Thorac Cardiovasc Surg 2014;148:1443-9)

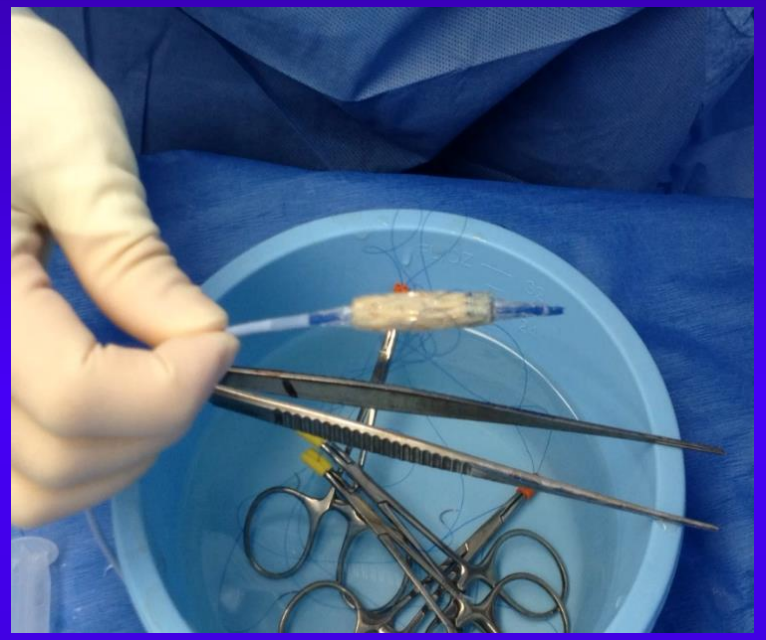
The Annals of Thoracic Surgery

Volume 94, Issue 4, October 2012, Pages e97-e98

Melody valve implantation technique

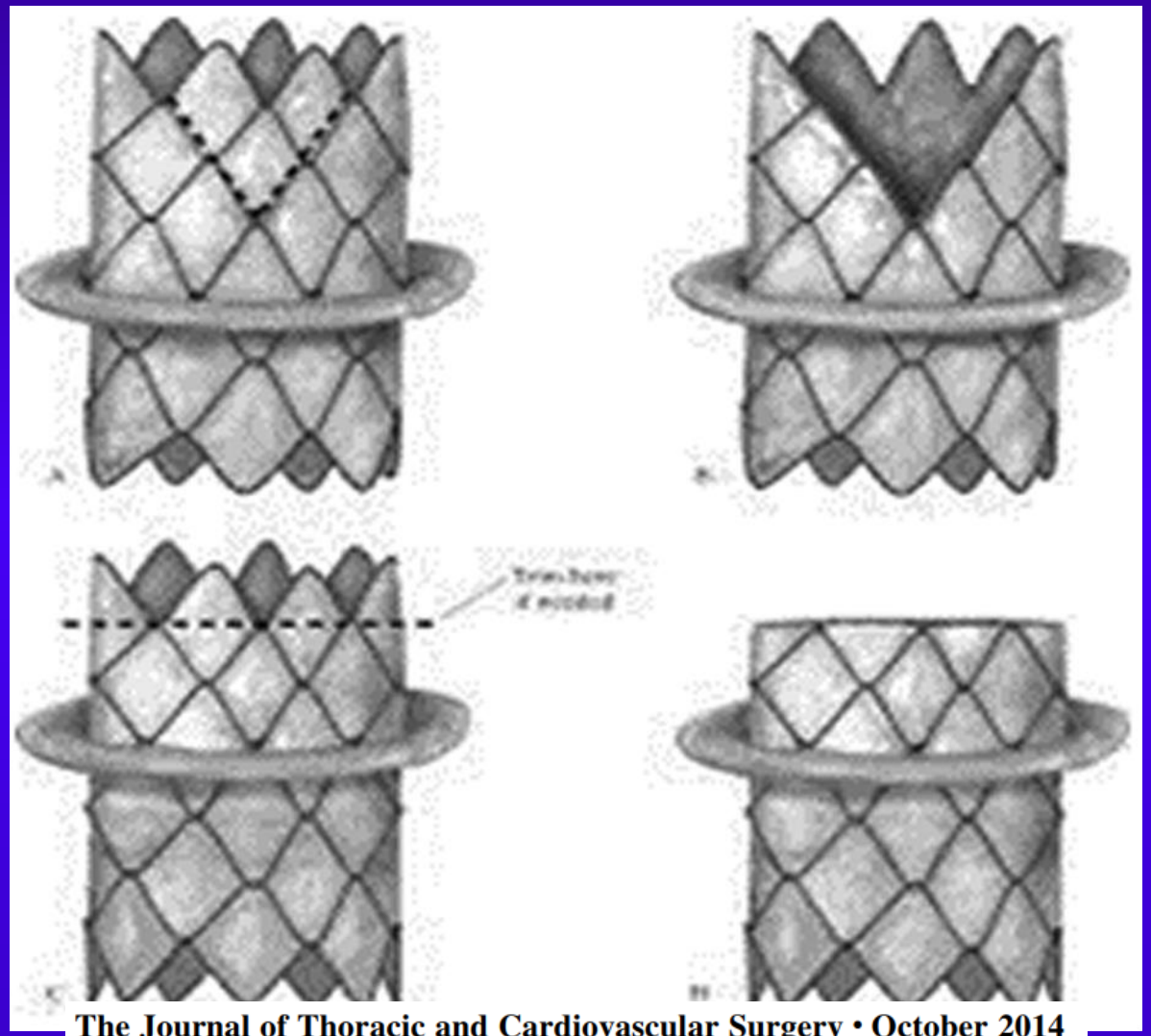


Melody valve preparation



The Journal of Thoracic and Cardiovascular Surgery • October 2014

Melody valve adjustment



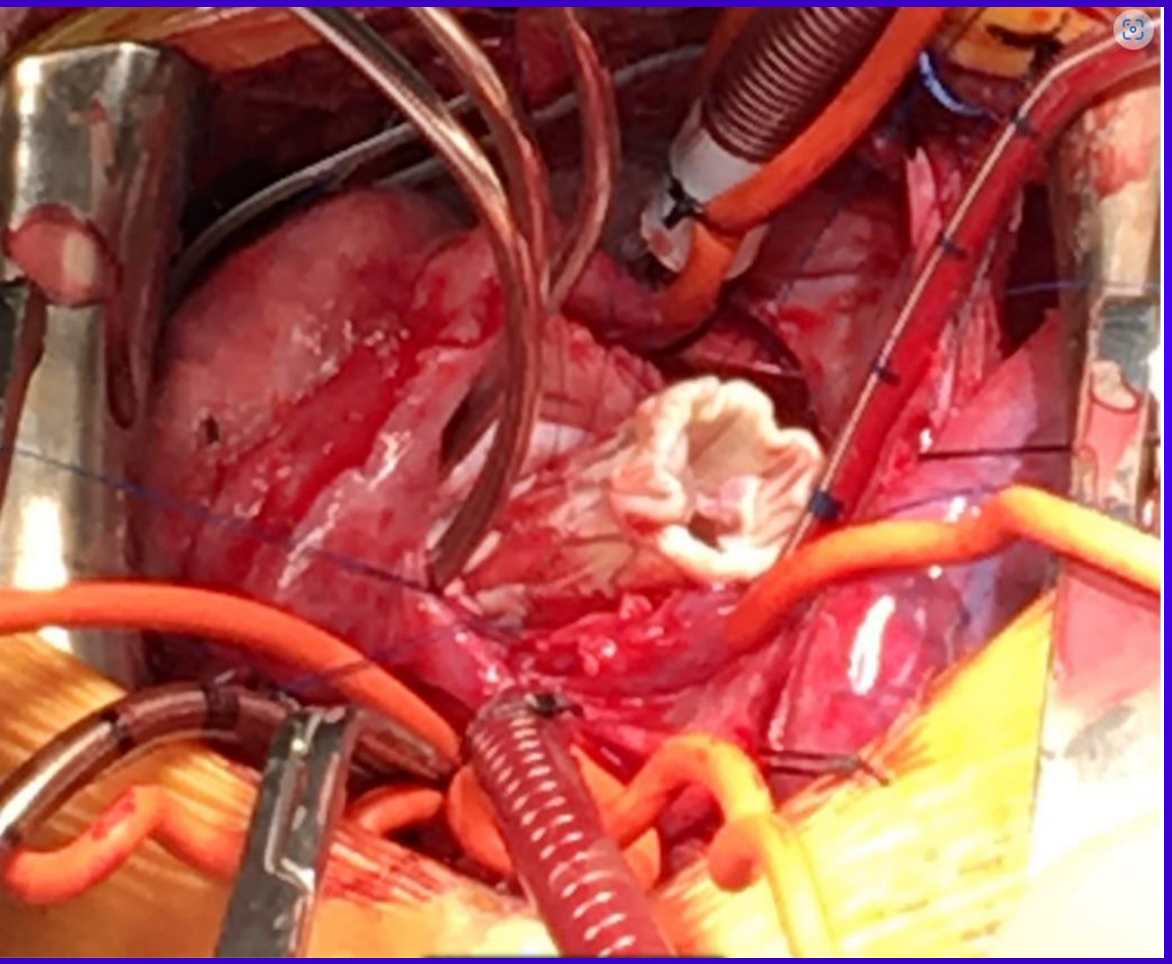
The Journal of Thoracic and Cardiovascular Surgery • October 2014

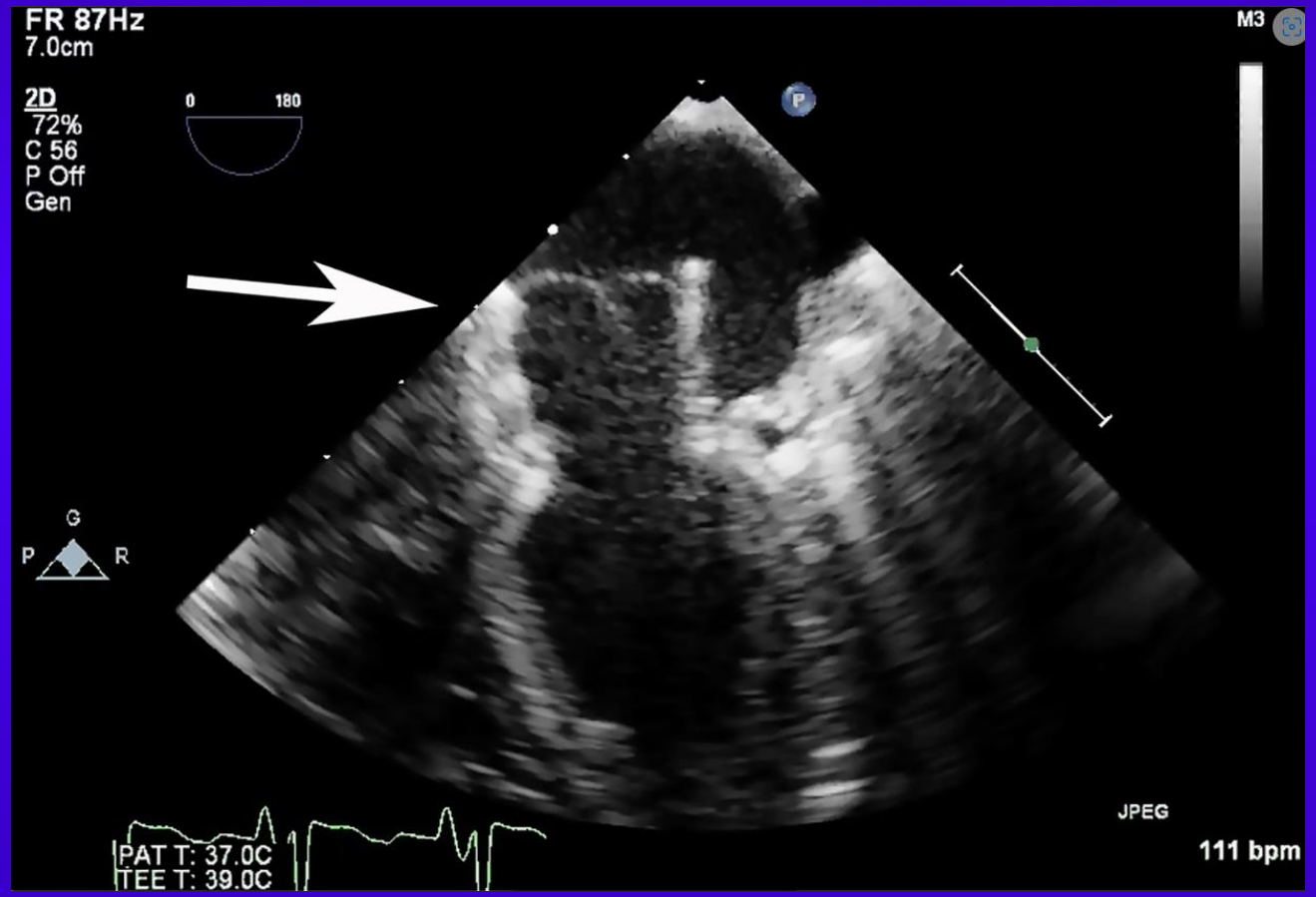
The Journal of Thoracic and Cardiovascular Surgery
JTCVS

Modified technique for Melody valve implantation in the mitral position

J Thorac Cardiovasc Surg 2018;156:1190-1

Nathaniel B. Langer, MD, MSc,[a] David Solowiejczyk, MD,[b] John T. Fahey, MD,[c] Alejandro Torres, MD,[b] Emile Bacha, MD,[a] and David Kalfa, MD, PhD,[a] New York, NY, and New Haven, Conn

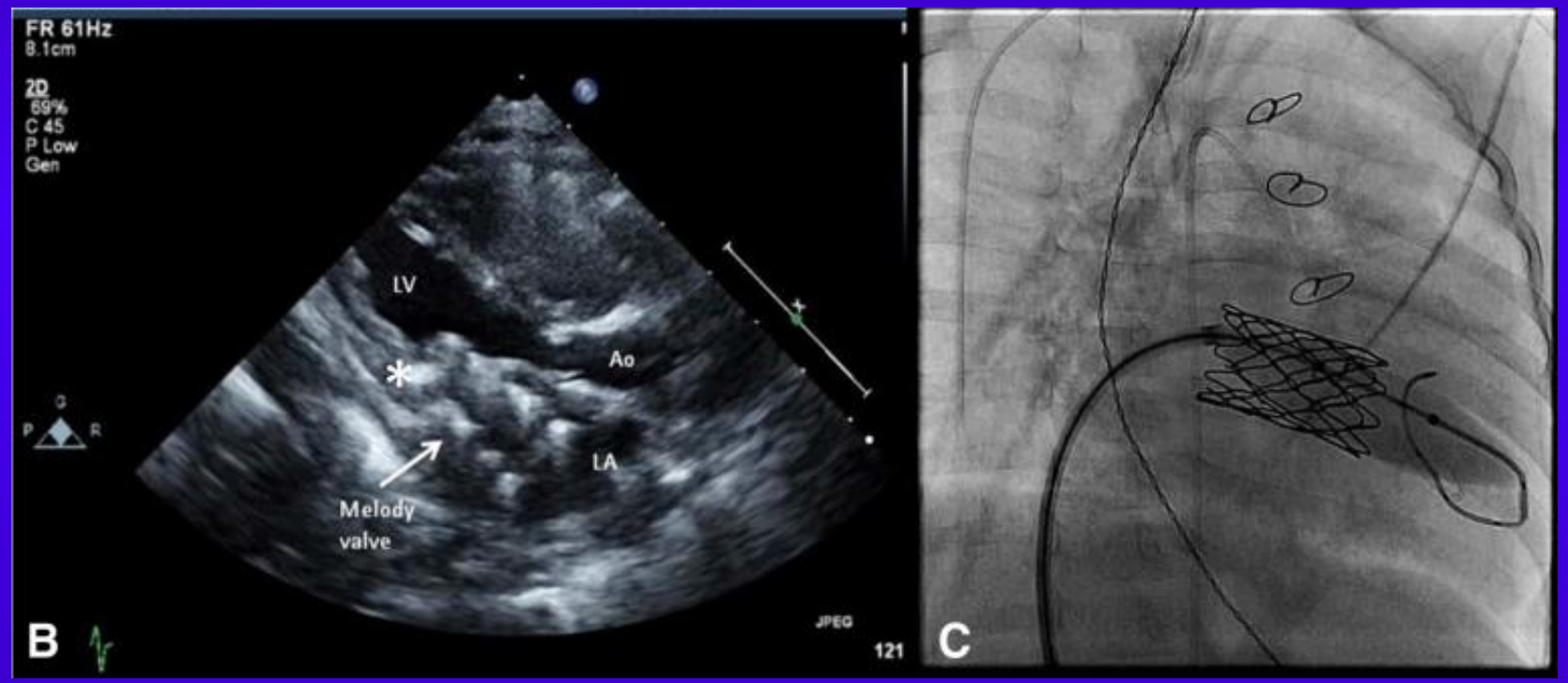




The Journal of Thoracic and Cardiovascular Surgery
JTCVS

Stented bovine jugular vein graft (Melody valve) for surgical mitral valve replacement in infants and children

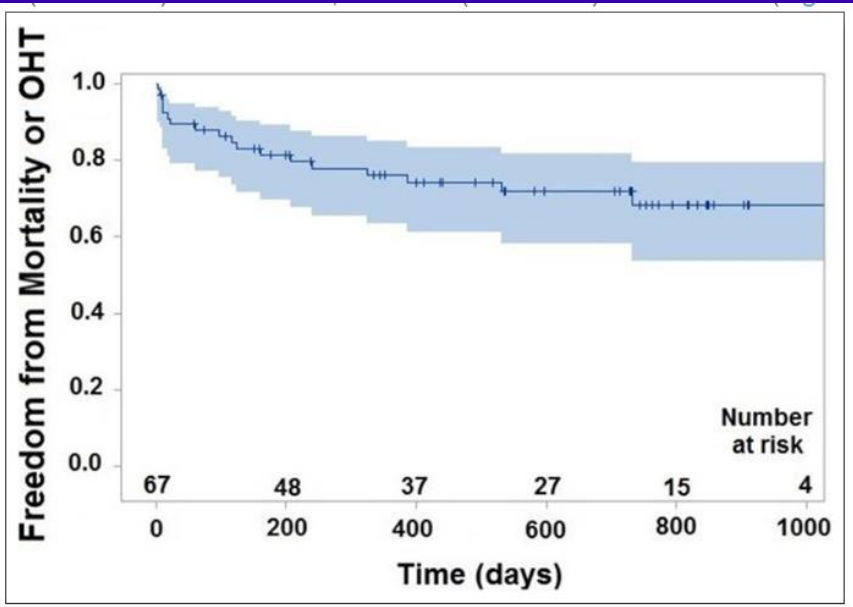
Luis G. Quiñonez, MD,[a] Roger Breitbart, MD,[b] Wayne Tworetsky, MD,[b] James E. Lock, MD,[b] Audrey C. Marshall, MD,[b] and Sitaram M. Emani, MD[a]



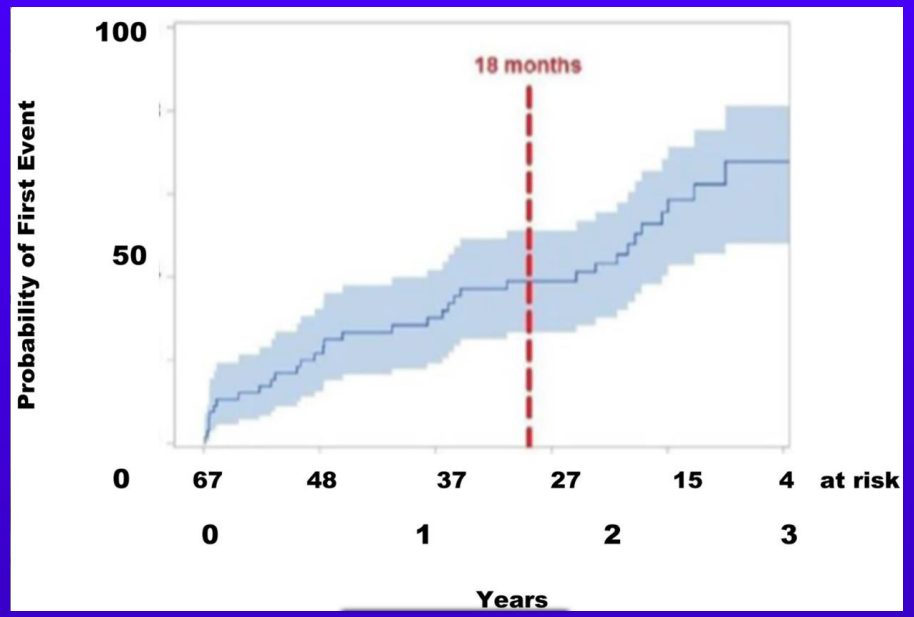
Surgical Atrioventricular Valve Replacement With Melody Valve in Infants and Children

A Multicenter Study

Circulation: Cardiovascular Interventions
Volume 11, Issue 11, November 2018



- 59 Pts, mean age
- 22% - mortality
- 36% required redo MVR after 18 months at avarage



Reported complications after Melody valve implantation in mitral position

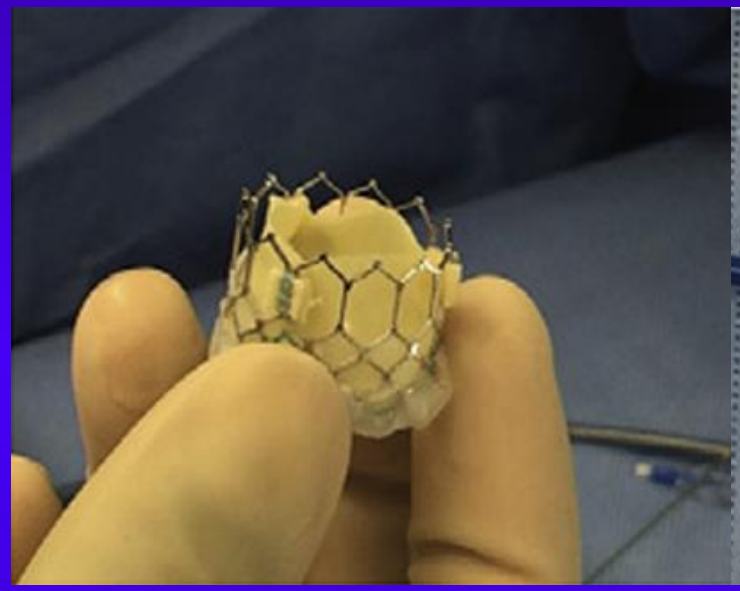
- Stent fracture resulting in acute acute mitral stenosis
- LVOTO – 20% - prior to modification of implantation technique
- Paravalvular leak – 15% despite the modification technique.
- LV pseudoaneurysm

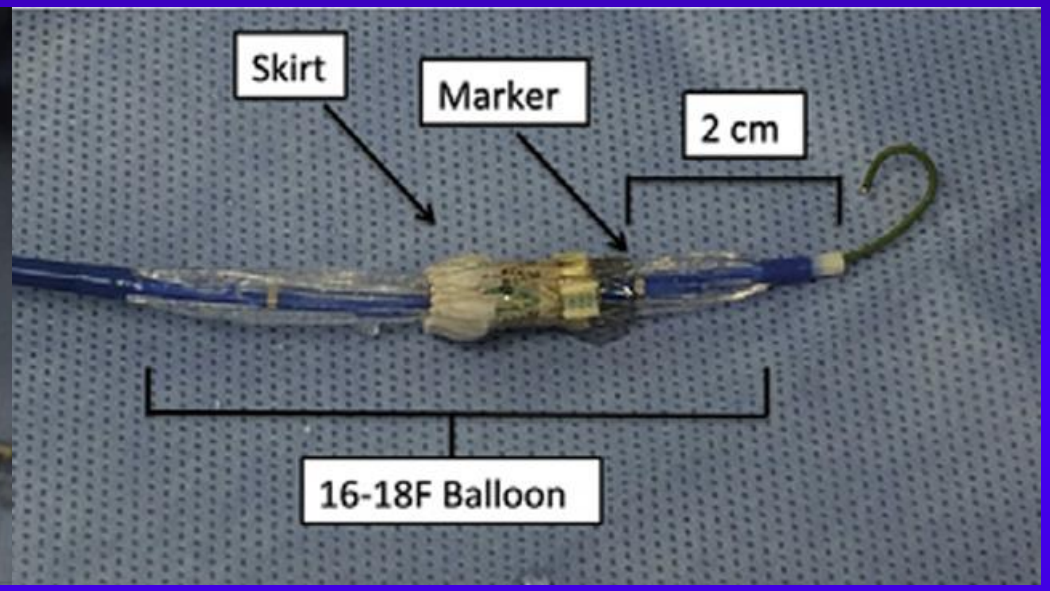
The Journal of Thoracic and Cardiovascular Surgery
JTCVS

Use of stented bovine pericardial valve for surgical mitral valve replacement in infants

The Journal of Thoracic and Cardiovascular Surgery • Volume 151, Number 3

Paul J. Chai, MD,[a] Isaac George, MD,[a] Tamim M. Nazif, MD, FACC,[b] David M. Kalfa, MD, PhD,[a] Susheel K. Kodali, MD, FACC,[b] Alejandro J. Torres, MD,[c] Julie A. Vincent, MD,[c] Martin B. Leon, MD, FACC,[b] and Emile A. Bacha, MD,[a] New York, NY





- Designed as an aortic valve
- Has a skirt
- Diameter 18 – 22 mm

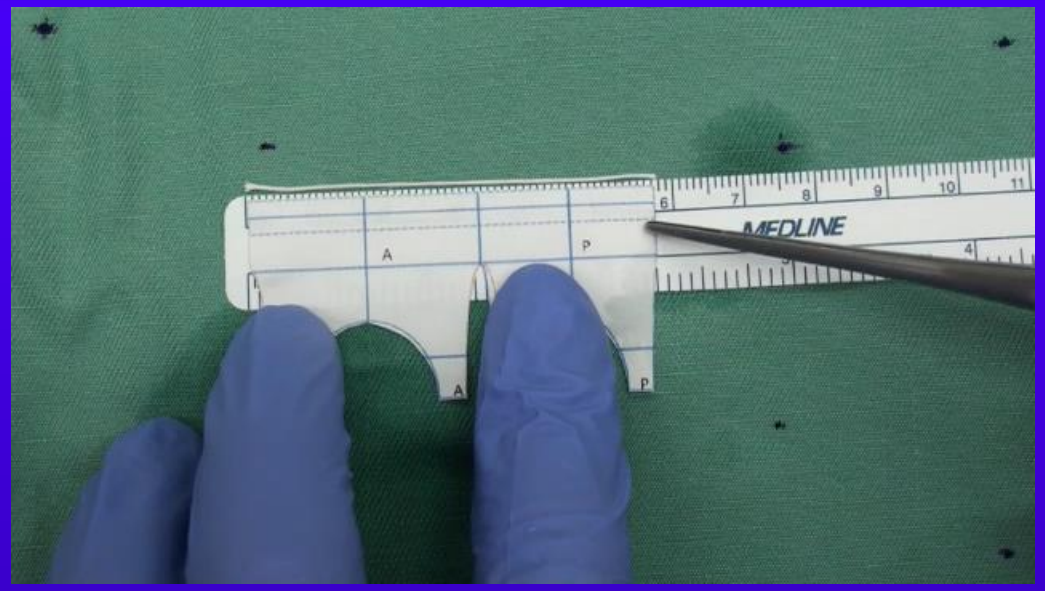
Hand-made cylindrical valves

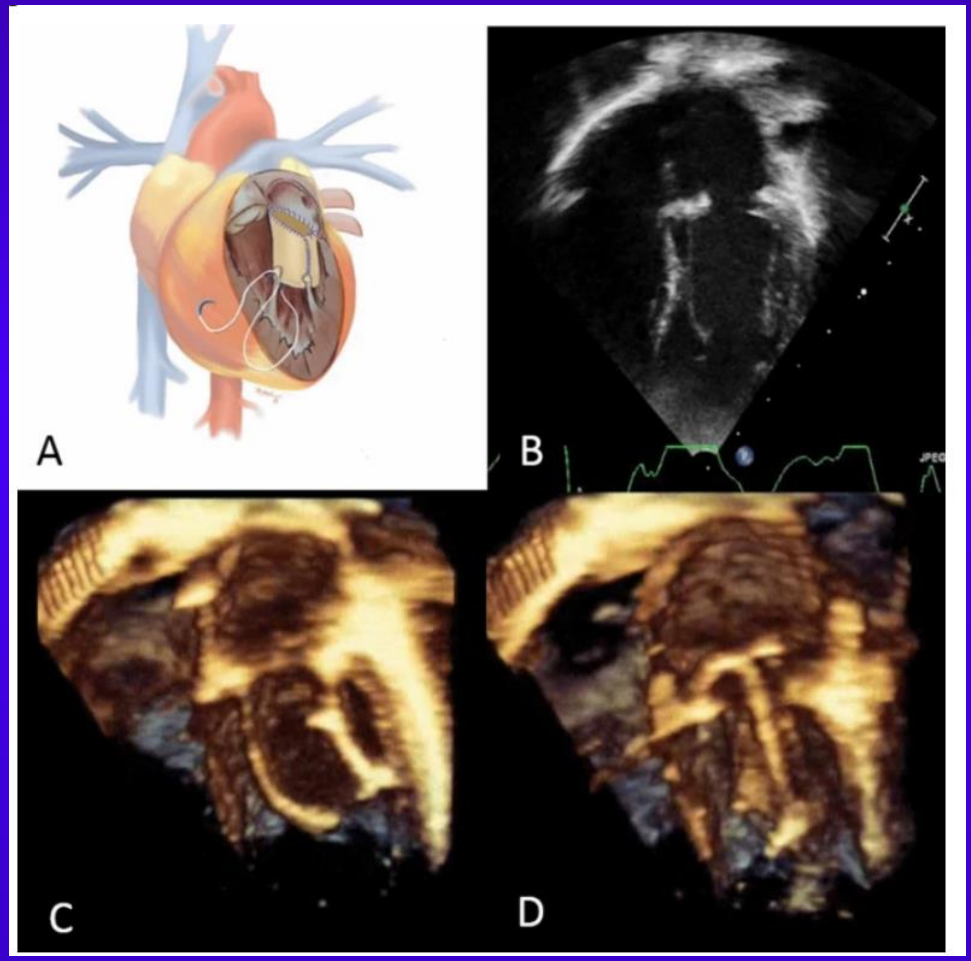
Pediatric Cardiology

Mitral Valve Replacement in Pediatrics Using an Extracellular Matrix Cylinder Valve: A Case Series

Carmen Kiper[1] · Clifford L. Cua[1] · Peter Baker III[2] · Patrick McConnell[3]

Received: 1 April 2020 / Accepted: 22 May 2020 / Published online: 30 June 2020

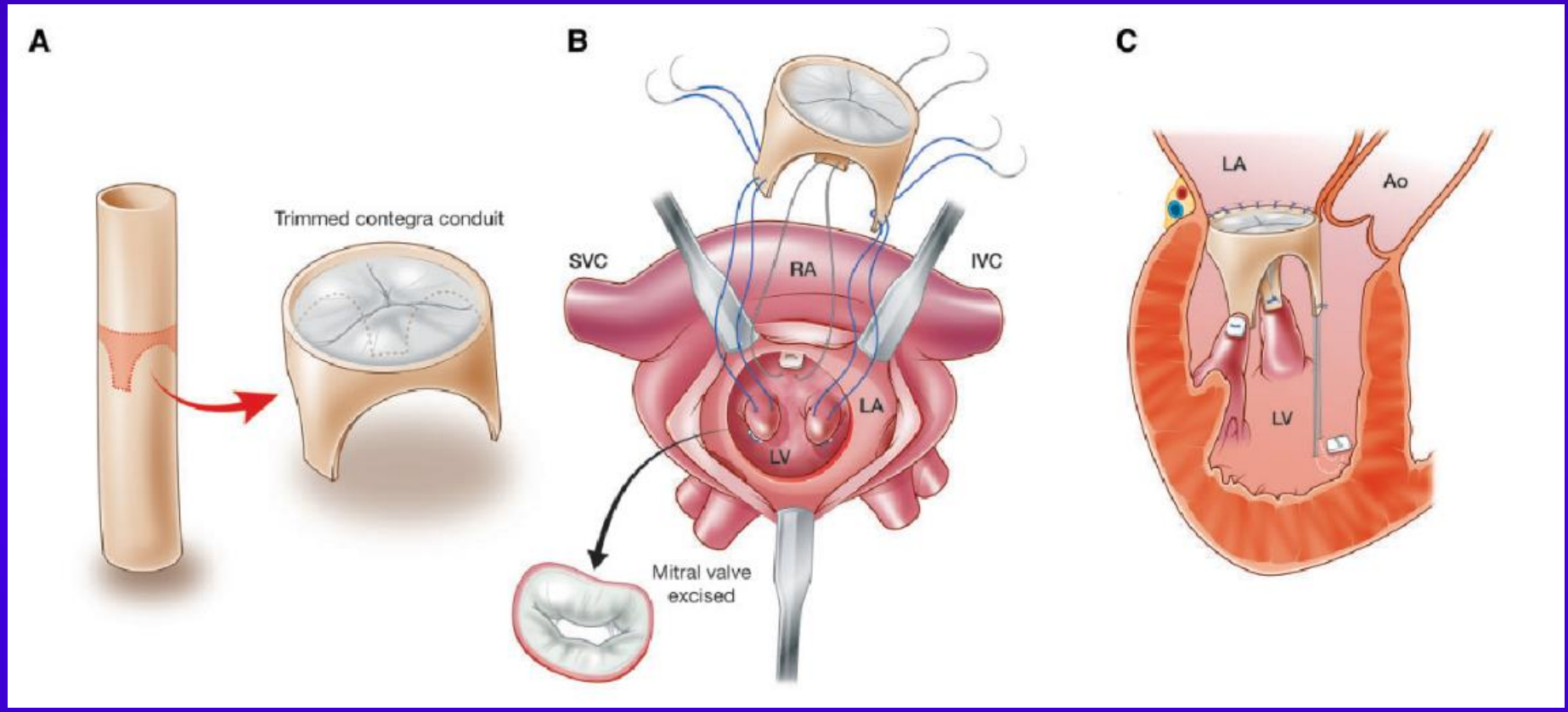




The ordeal of left atrioventricular valve replacement in children under 1 year of age†

Elie B. Sawan[a,*], Johann Brink[a], Jerome Soquet[a], Matt Liava'A[a], Christian P. Brizard[a,b,c], Igor E. Konstantinov[a,b,c] and Yves d'Udekem[a,b,c]

Interactive CardioVascular and Thoracic Surgery 25 (2017) 317–322

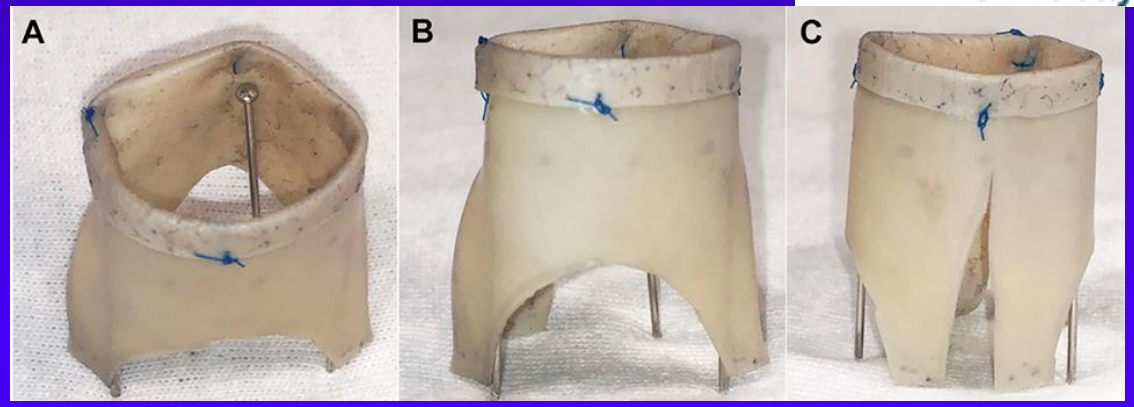


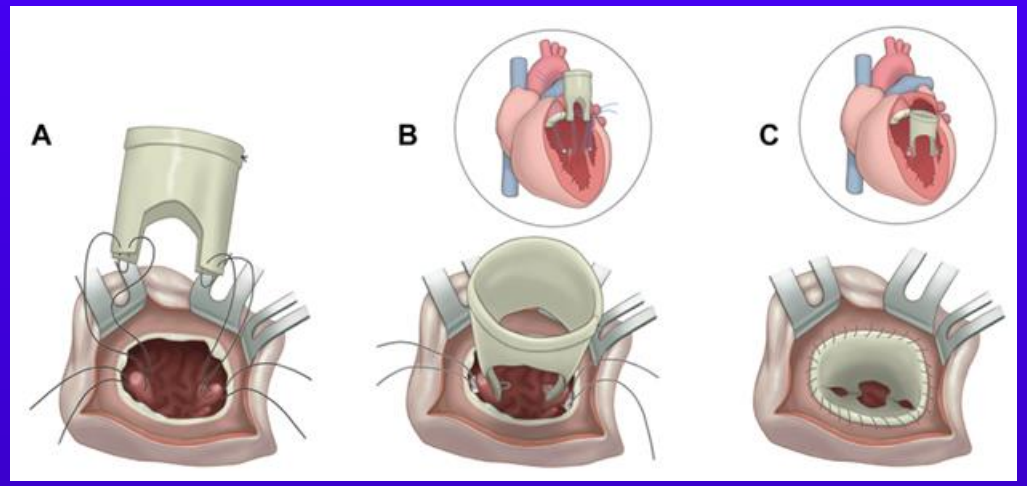
Research

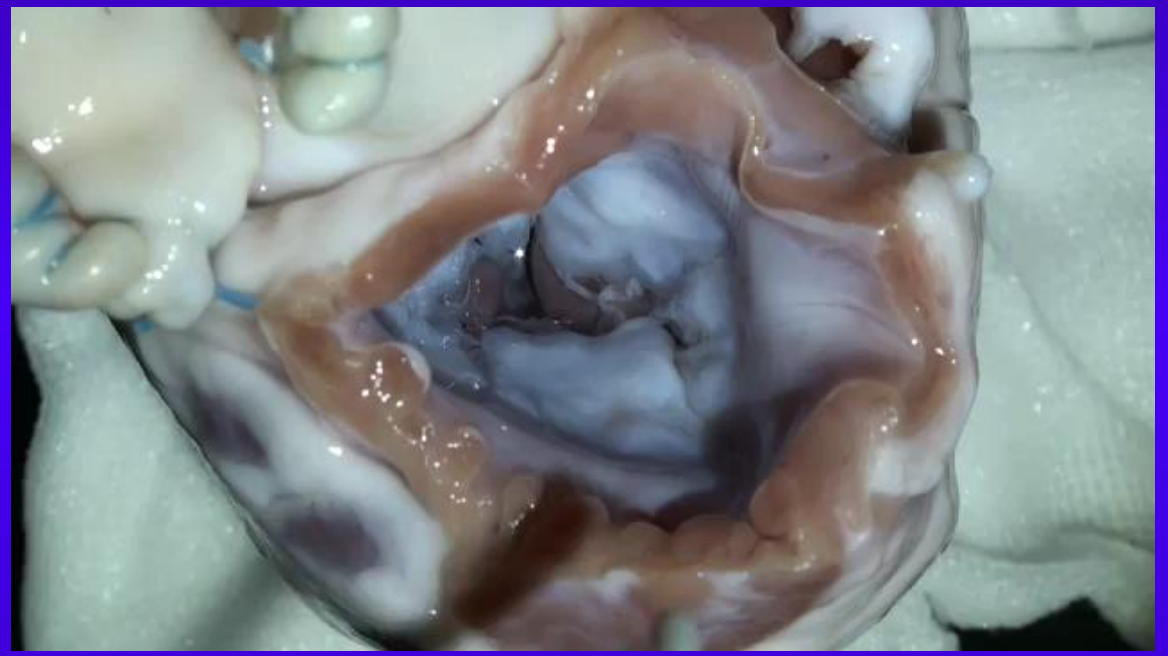
Valve: New Technology (Ann Thorac Surg Short Reports 2023;1:642-646)

A Novel Template and Cylinder Bioprosthetic Atrioventricular Valve: An Ex Vivo Study

Shinka Miyamoto, MD, PhD,[1,2] Toshiharu Shinoka, MD, PhD,[2,3] and Kei Kobayashi, MD, PhD[4]







Boston Children's Hospital

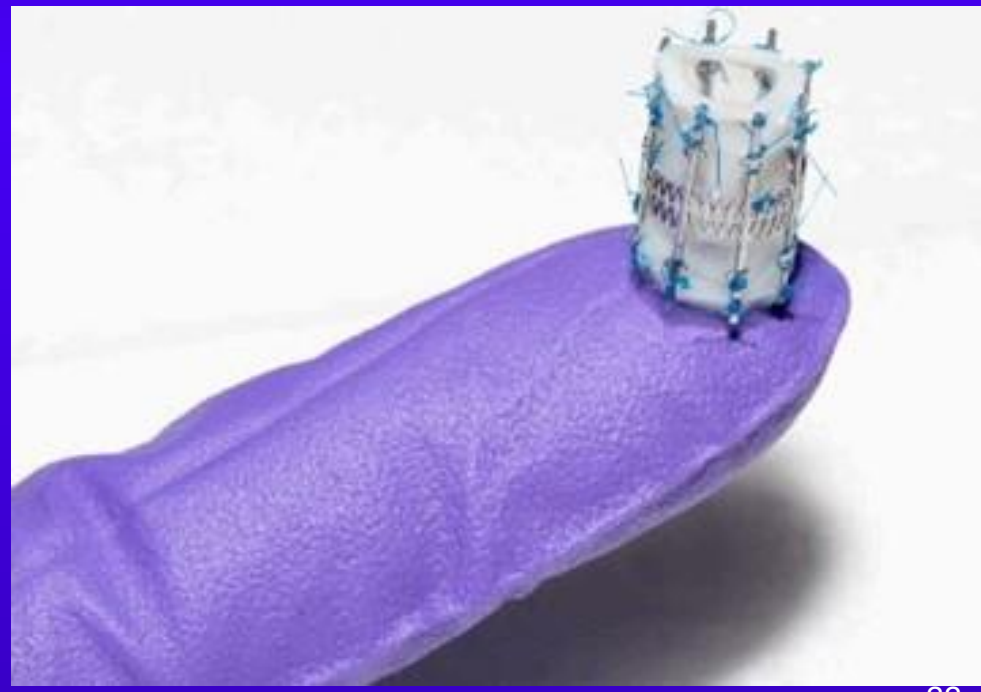
DRAPER

News |

Finally, A Heart Valve For Children

The first pediatric heart valve that's designed to "grow" with the child

"We envision this technology serving a majority of the pediatric population ranging from infancy to six years old, while eliminating the need for at least one surgical or invasive procedure to expand or replace the valve. We are working closely with pediatric clinicians, including a team led by Dr. Sitaram Emani at Boston Children's Hospital, to design the PHV to fit their specific needs and hopefully increase the number of centers that can perform valve replacements in children."



Conclusions

- Outcomes of treatment of valves which can not be repaird are sobering, although the results from current era suggest acceptable early mortality.
- Because of size issues and anticoagulation related problems the most promissing option are stented valves in mitral position.
  - well suited to the patient with a hypoplastic mitral annulus with excellent resulting hemodynamics across the prosthesis.
  - subsequent dilation is effective without incurring significant mitral regurgitation.
  - The incidence of paravalvar leak and LVOTO remain concerns, and whether recent technical modifications effectively address these issues is not currently known.

Thank you.

- Thank you very much for your attention.