Right Ventricular Outflow Tract Reconstruction with a PTFE Monocusp Valve

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Disclosures

John W. Brown, MD

- **Cryolife** – Honorarium for Ross AVR presentations

- **Correx Inc.** Board of Directors - equity ownership in start up for making AVB surgical instruments

- **Medtronic** - consulting on PVR products & Proctoring AVB procedures

- **Harpoon Inc.** - SAB – Minimally invasive mitral repair
Background

• Surgical management of the RVOT remains a “weak link” in the treatment of children with CHD.
• Pulmonary valve preservation is always the first objective but is frequently impossible in TOF, PA w/VSD and other complex CHD.
• Acute and chronic PR leads to RV dysfunction and symptoms of RV failure.
• Pulmonary valve reconstruction (PVR) has been problematic in infants for decades and many materials for RVOT reconstruction have been utilized but none proven durable.
Background

- RVOT reconstruction with a PTFE monocusp outflow tract patch (MOTP) was introduced in Japan in 1993 and adopted at our center in 1994
Objective

• Review the short-term and mid-term function and durability of the PTFE-MOTP for several types of RVOT reconstruction
0.1 mm PTFE was introduced for pericardial closure and can be used “off label” to construct a PV monocusp leaflet.

The monocusp leaflet is custom-tailored for each RVOT.

The RVOT transannular patch was constructed with 0.4 mm PTFE material.
Study Groups
(n=259; mean age: 2.8 ± 4.1 years, 1994-2014)

• **Group 1:** Initial repair of TOF or PA/VSD: 170 patients

• **Group 2:** Redo RVOT reconstruction: 37 patients

• **Group 3:** Complex initial repair: 52 patients
  - DORV, TOF with AV canal defect, and others
Control Group

- Initial RVOT reconstruction with bovine jugular conduit
- Chosen to most closely match groups 1 and 3
  - 38 patients (mean age 1.4 ± 1.9 years, range 6 days to 10 years)
Results

• **Mortality**: 7 early deaths and 9 late deaths (16/259: 6%)

• **Follow up**: 229 patients (88%) had follow-up within the last 4 years
  • Mean duration: $11.6 \pm 5.7$ years

• **Re-operation**: 73 patients (32%) → bovine jugular conduit was used in 56% of reoperations
Pulmonary Stenosis (PS)

- The monocusp itself did not become obstructive.
  - PS when found was infundibular or in the branch PAs
- Reported in 141 patients at most recent echocardiographic follow-up (9.1 ± 5.0 years)
  - Mild PS (<20 mmHg): 99 patients
  - Moderate PS (20-40 mmHg): 24 patients
  - Severe PS (>40 mmHg): 15 patients
Freedom from Re-operation

- **Group 1**: TOF or PA/VSD
- **Group 2**: Redo RVOT reconstruction
- **Group 3**: Complex initial repair
- **Control**: Initial RVOT reconstruction with bovine jugular conduit

Log rank = 0.004
Group 1: TOF or PA/VSD

Group 2: Redo RVOT reconstruction

Group 3: Complex initial repair

Control: Initial RVOT reconstruction with bovine jugular conduit

Log rank=0.035 (groups 1-3)
Log rank=0.079 (all groups)
Conclusions

- Pulmonary valve preservation is always 1st priority and is possible in 70% of pts. with TOF
- PTFE-MOTP is palliative
- PTFE-MOTP is an excellent choice for initial RVOT reconstruction, especially for TOF and PA/VSD with 80% freedom from re-operation at 10 years.
- PTFE-MOTP is not ideal for re-do RVOT reconstruction
- Complex initial repair using PTFE-MOTP is durable but is associated with higher early & late mortality
THANK YOU!
Choice of Valve Replacement

- Bovine Jugular Conduit, 42
- Porcine-stentless, 14
- Porcine-stented, 3
- Homograft, 4
- Transcatheter valve, 4
- Pericardial valve, 3
- New monocusp, 5
PTFE Monocusp Technique
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PTFE Monocusp Technique
PTFE Monocusp Technique
PTFE Monocusp Technique (conduit)
Intraoperative TEE
RVOT 6mo. Post-implant: systole
RVOT 6mo. Post-implant: diastole