Atrioventricular valve repair: The limits of operability

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Nothing to disclose
Good judgement comes from experience….

Experience comes from bad judgement …

C Walton Lillehei MD
Challenging AV valves

• Mitral Valve
  • Congenital mitral stenosis
  • Residual mitral (left AVV) regurgitation after CACV repair

• Tricuspid valve
  • Ebstein’s Anomaly
  • Tethered leaflets
  • Acquired septal leaflet immobility
  • Systemic Tricuspid Valve
Assessing AV valves

- Echo: primary modality for evaluation of the severity of the valve disease
- View of the supra-annular region, annulus, leaflets, chordae and papillary muscles (+ ventricular size and function)
- Mean gradients
- 3D echo imaging: simultaneous evaluation of the entire valve
  - Provides surgeon’s view
  - Allows for area measurements
Congenital mitral stenosis

1. Supravalvar
   - Supramitral ring

2. Valvar
   - Fusion of commissure and papillary muscle
   - Double orifice

3. Subvalvar
   - Single papillary muscle (Parachute valve)
   - Numerous papillary muscle (Hammock valve)
Resection of supramitral ring
Splitting of papillary muscle in parachute mitral valve
Fenestration of subvalvar hammock/arcade
Commissurotomy
BCH experience

• Between 2000-2013, 117 patients underwent 177 operations
• Mean age 3.41 years and mean weight 12.43 kgs
• 78 (67%) presented with MS and 39 (33%) with associated MR
• No early deaths and five late deaths
• Younger patients had increased mortality
• Freedom from reoperation 77, 69 and 63%
Mitral valve replacement

• Incidence low
• 20/117 patients ~ 17% were for MVR
• Trend towards less MVR for isolated MS vs MS/MR
• Valve options limited in infants and small children
• 11 patients had Melody valve implantation
Failed repair for congenital stenosis

 ✓ Valve replacement options limited in neonates/infants

 Melody valve replacement of the mitral valve
Mitral inflow
Identification of Regurgitation
Residual mitral (left AVV) regurgitation after CACV repair
Residual cleft
Leaflet prolapse
Division of tethering secondary chords
Augmentation of Bridging Leaflets in Repair of Atrioventricular Canal Defects

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Left atrioventricular (AV) valve regurgitation is the most common complication after a atrioventricular canal defect (AVCD) repair. Despite what appears to be a less complex repair, patients with partial and transitional AV canal have higher reoperation rates for left AV valve regurgitation and left ventricular outflow tract (LVOT) obstruction. Retraction of bridging leaflets with secondary attachments to the septal crest commonly produces increased tension and flattening of the medial left AV valve leaflet and LVOT obstruction after cleft closure. We describe a novel technique of detachment and patch augmentation of bridging leaflets to avoid these complications.

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![Diagram of heart showing surgical procedures]
Congenital Defects of the Tricuspid Valve

- Ebstein’s Anomaly
- Tethered leaflets
- Acquired septal leaflet immobility
  - VSD closure
  - ToF repair
- Systemic Tricuspid Valve
Ebstein’s Anomaly of TV

Ebstein’s anomaly of tricuspid valve
The Cone technique for Ebstein’s

da Silva et al:
Cone technique
Late results of cone procedure @ BCH

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“Tethered” Tricuspid valve

- Associated with pulmonary stenosis or atresia
- Results in TR as the RV dilates
- Release of tethered leaflets – secondary chords
- Ring annuloplasty is ineffective treatment
- Papillary muscle head repositioning
- +/- annuloplasty
Congenital Defects of the Tricuspid Valve

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• Tethered leaflets

• Acquired septal leaflet immobility
  – VSD closure
  – ToF repair

• Systemic Tricuspid Valve
Tricuspid Regurgitation after VSD closure (ToF repair)
Antero-septal commissural closure
Congenital Defects of the Tricuspid Valve

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Tricuspid Regurgitation in Single ventricles

- Changes in ventricular geometry as well as anterior papillary muscle (PM) displacement contribute to TR
As a result of papillary muscle displacement, the leaflets become tethered and prevent coaptation.
Tricuspid annuloplasty

Acceptable and durable coaptation can’t always be achieved using standard techniques in tricuspid valve repair for tethered leaflets associated with RV dilation
Novel technique to relieve tethering associated with severe tricuspid regurgitation

Bring the anterior papillary muscle and anterior leaflet closer to the posterior and septal leaflets

Allow the tethered leaflet to be bought up and closer to the natural coaptation plane
• Approximating the head of the anterior papillary muscle arising from the RV free wall to the ventricular free wall
Summary

• Congenital atrioventricular valve defects are common and are usually complex

• Repair preferred over replacement, however successful outcome requires:
  ✓ Precise preoperative imaging
  ✓ Understanding of congenital valve morphology
  ✓ Armamentarium of complex and novel repair techniques
Thank you