Surgical Repair of Complete Common Atrioventricular Canal Defect

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BEST CHILDREN'S HOSPITALS U.S.News CARDIOLOGY & HEART SURGERY 2017-18

MAGNET RECOGNIZED AMERICAN NURSES CREDENTIALING CENTER

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UMKC School of Medicine

Goals of CAVC Repair

- Close the inlet VSD
- Close the primum ASD
- Septate the AV valve including closing the “cleft” or “zone of apposition”
- More “art” than most surgeries

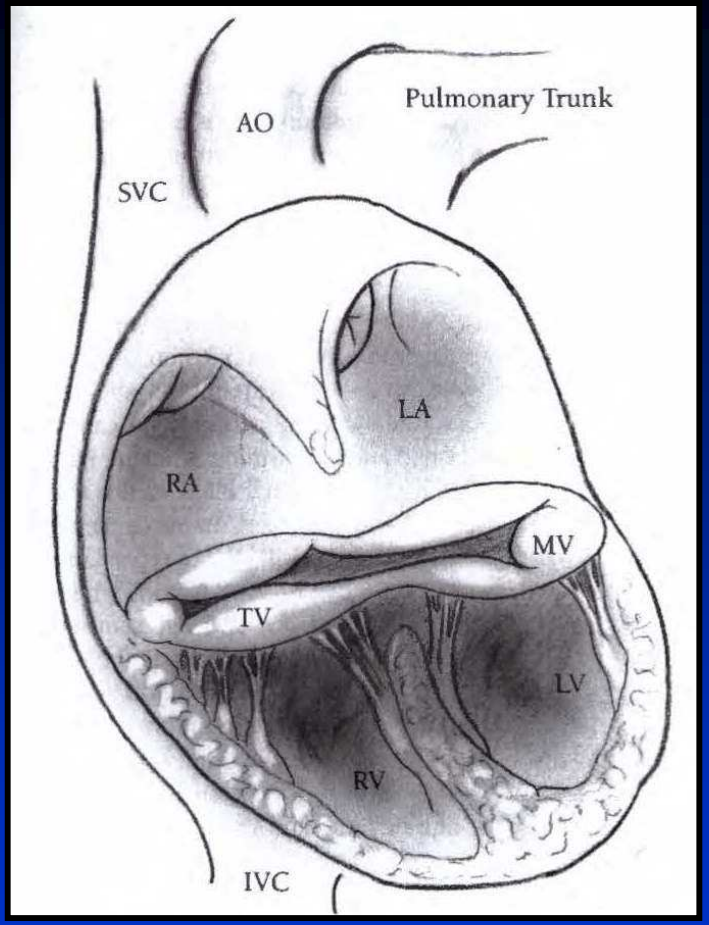
Three Accepted Techniques
(although proponents will proclaim their technique as the "only way to do it!")

- Two patch technique
- Single patch technique
- Modified single patch technique ("Nunn repair" "Australian technique" "Direct suture technique" "No VSD Patch Repair")

Common Approach

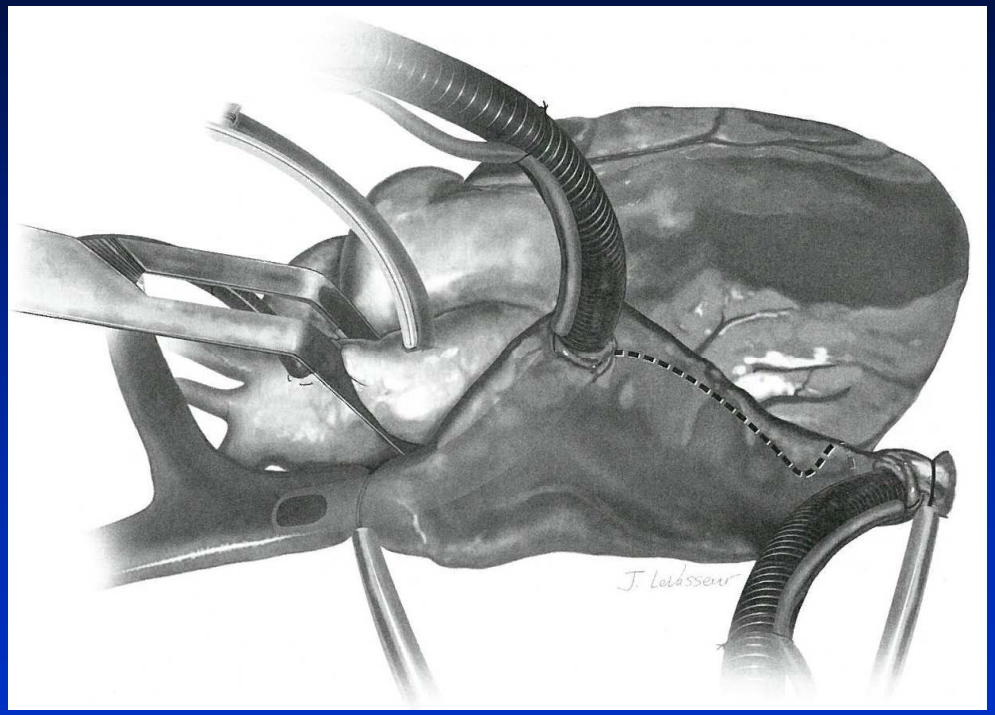
- Surgery performed between 3-6 months of age
- Median sternotomy
- Warm cardiopulmonary bypass
- Cardioplegic arrest
- Exposure via right atriotomy

Cutaway of CAVC

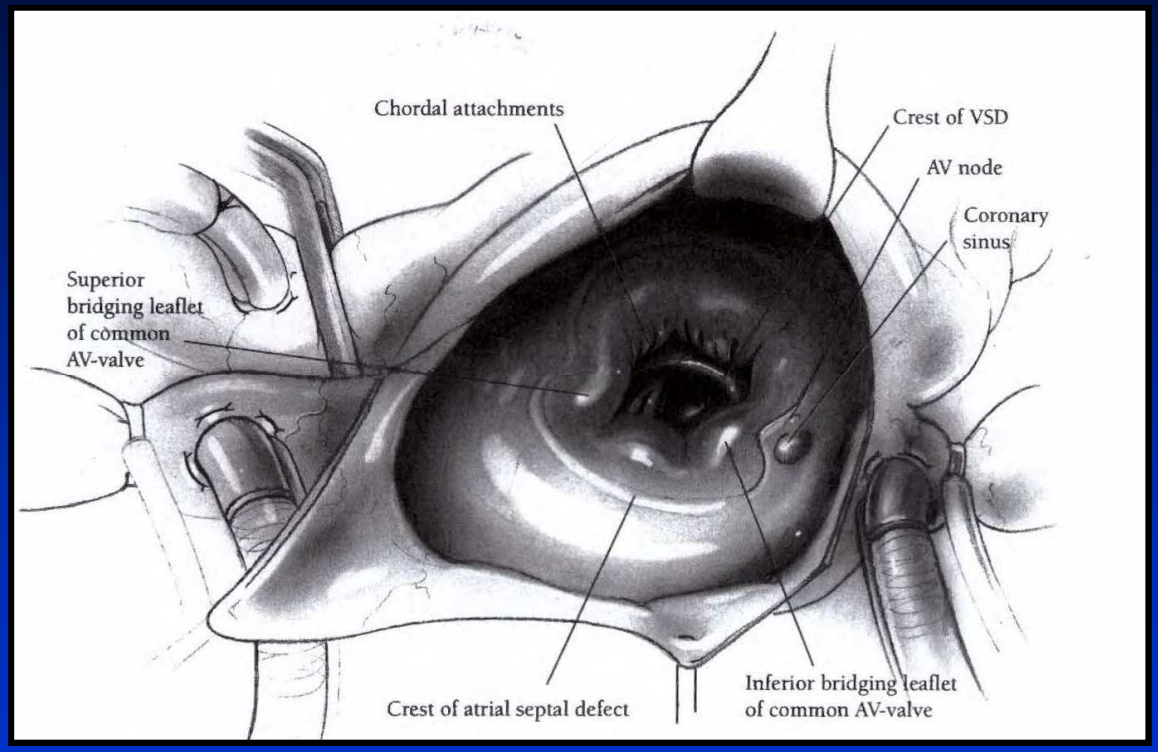


Daebritz SH: *Oper Techn Thorac Cardiovasc Surg* 9: 208-220

Approach via Right Atriotomy



Sooo, Obvious, Right?



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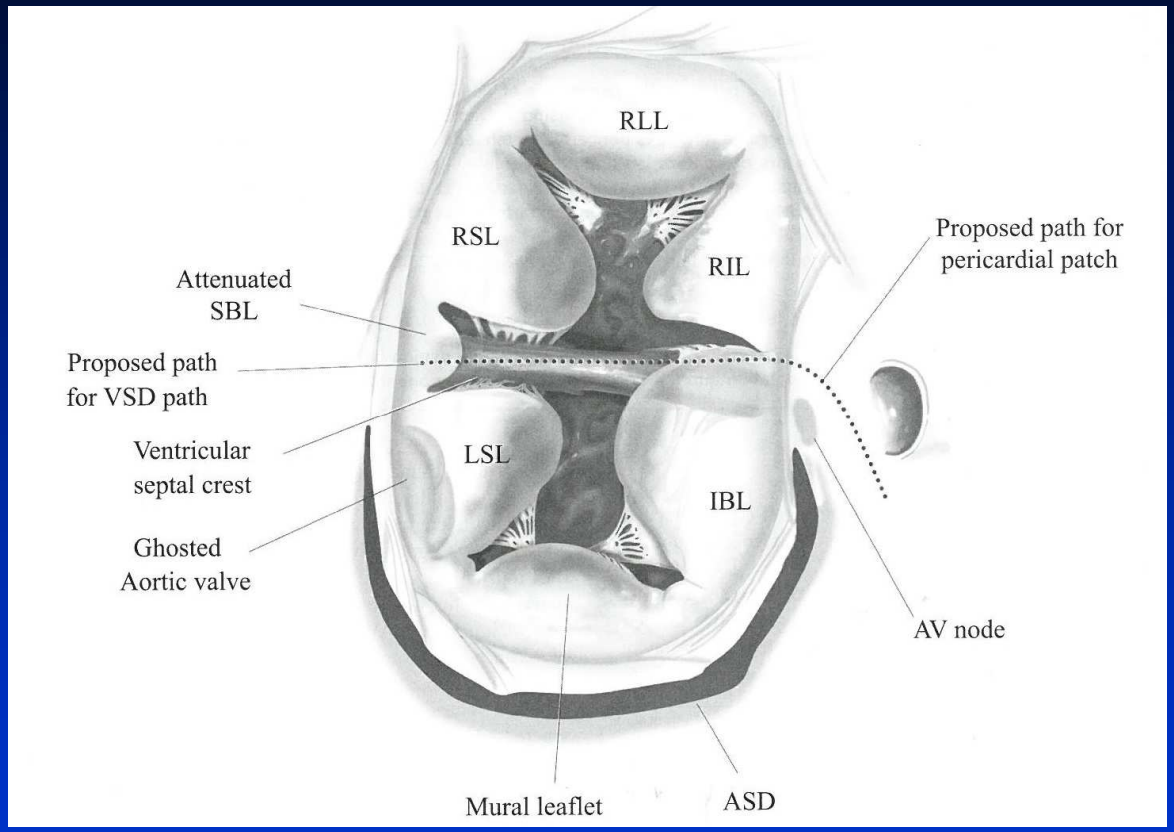
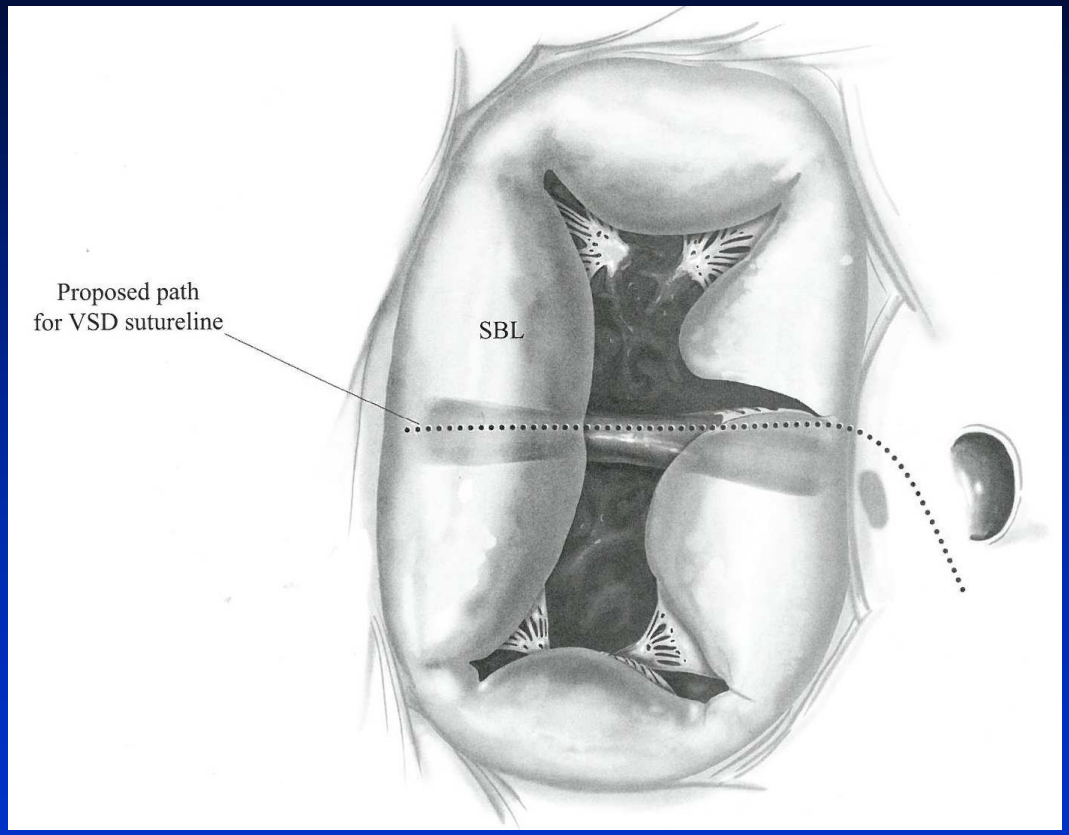
Surgeon's View

Rastelli Type A

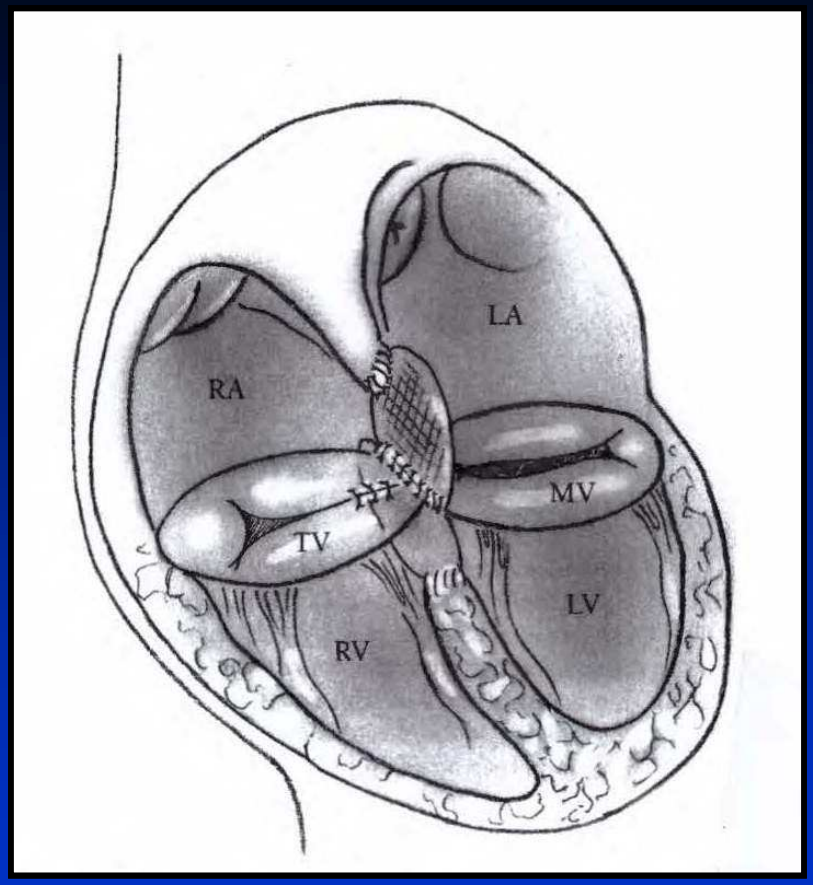


Surgeon's View

Rastelli Type C



Cutaway of CAVC with Repair Using Two Patch Technique



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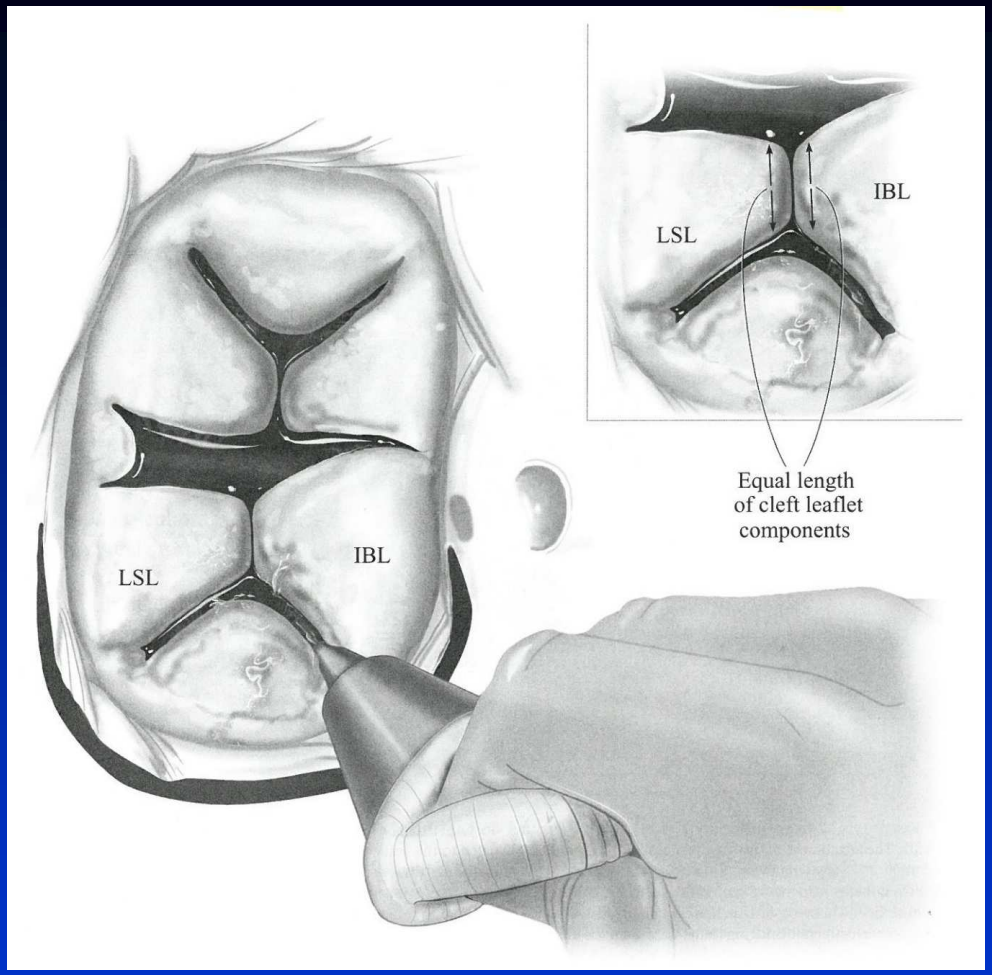
Two Patch Technique

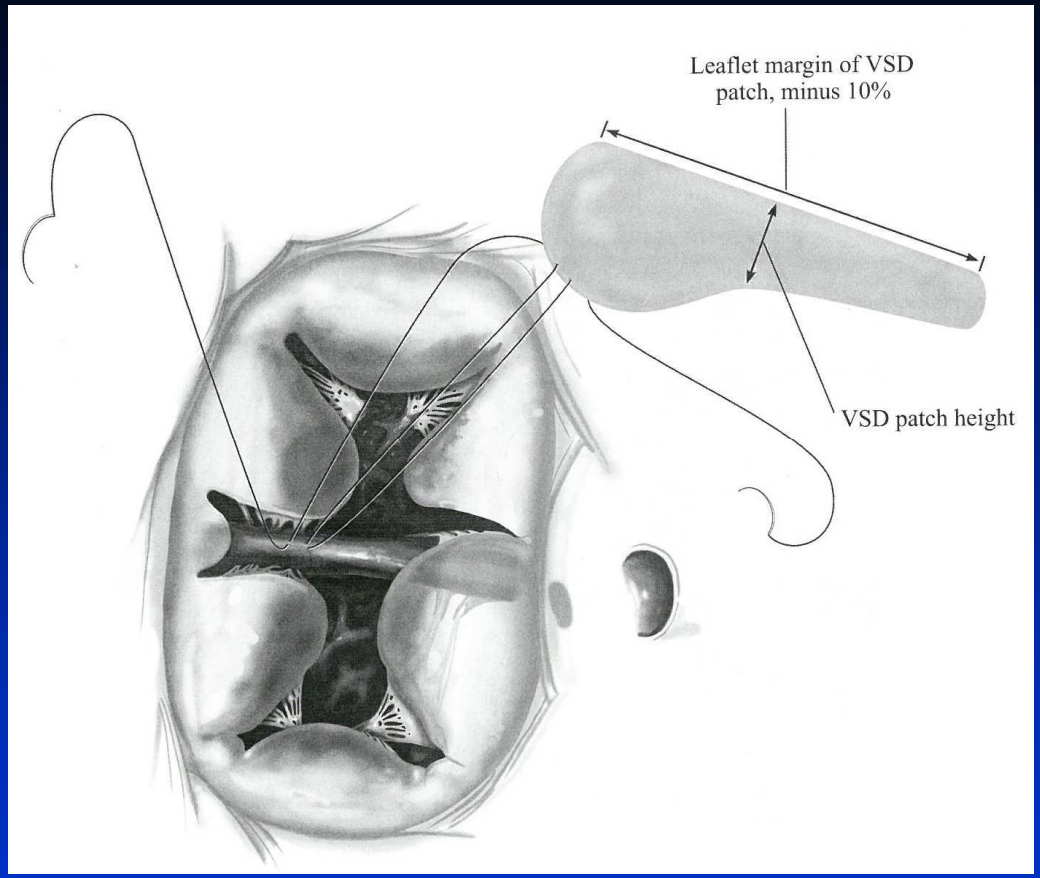
Floating the AV Valve and Identifying Zone of Apposition



Two Patch Technique

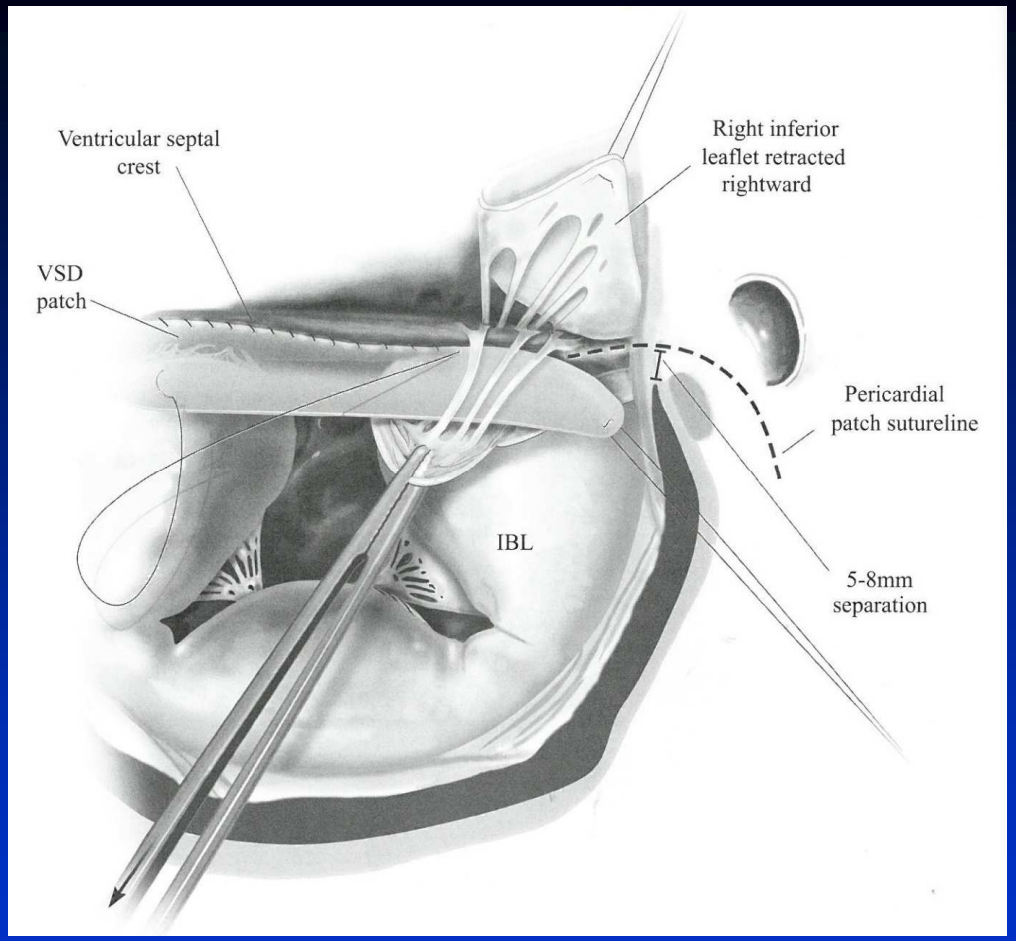
VSD Patch

Dacron, Gore-Tex, Fixed Pericardium, Bovine Pericardium



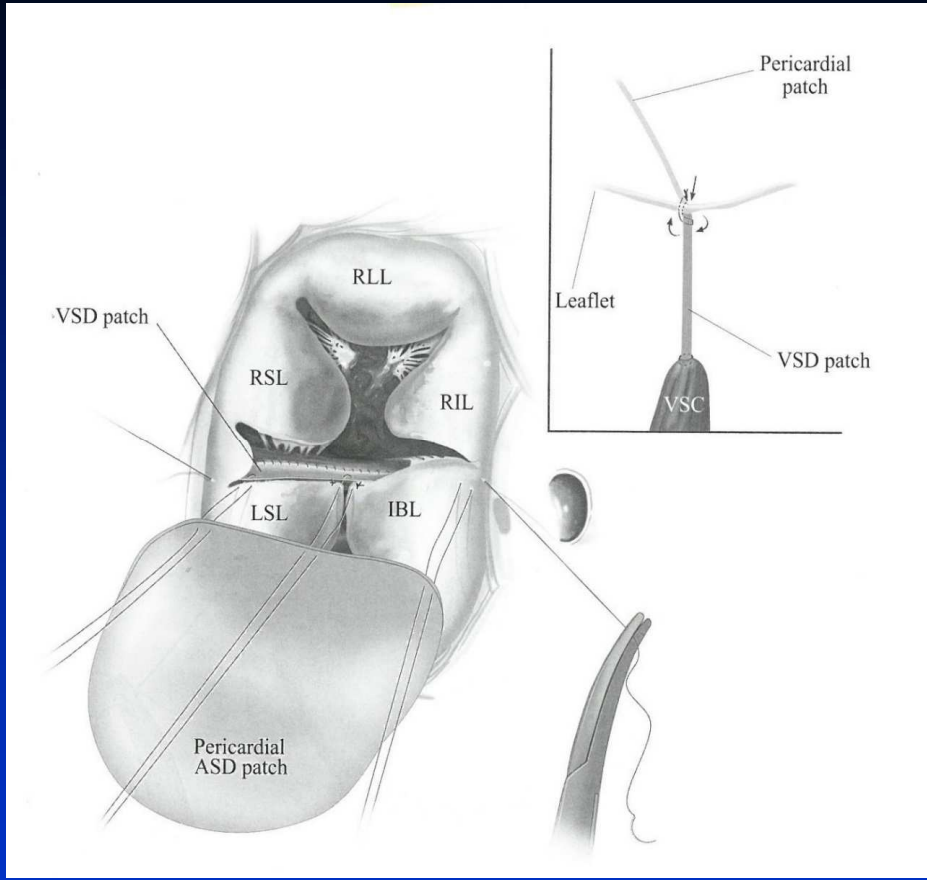
Two Patch Technique

VSD patch weaving between chordae



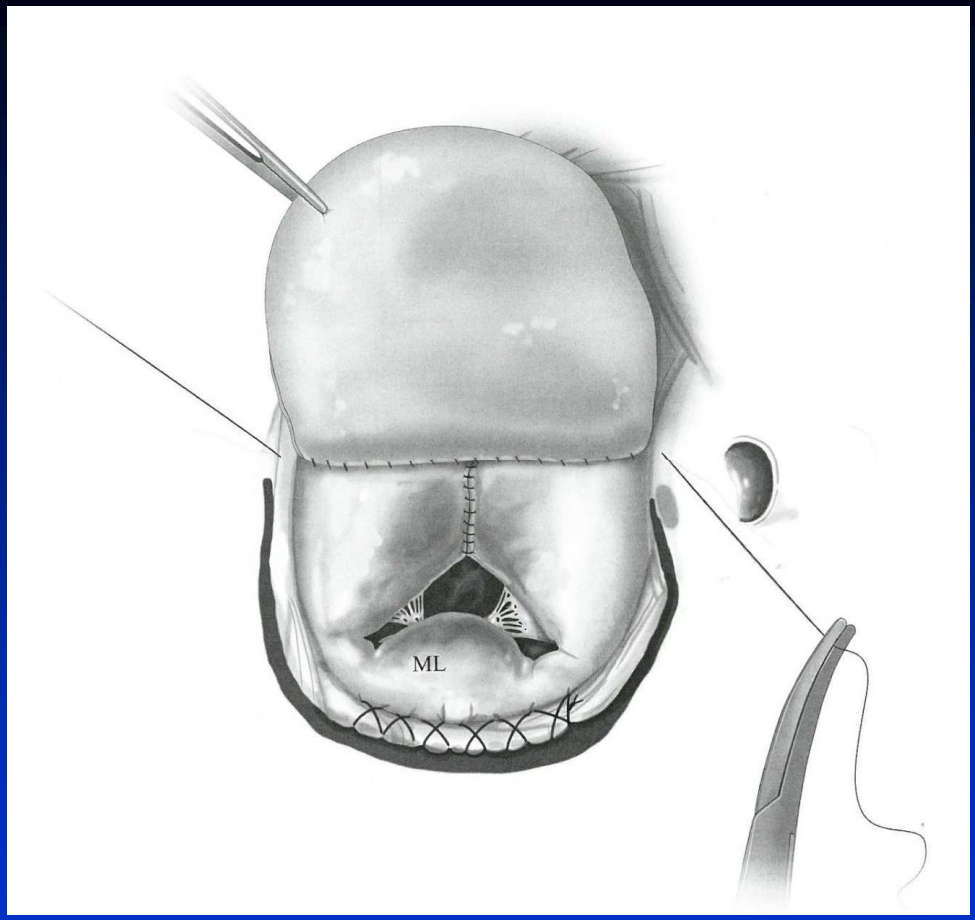
Two Patch Technique

Attaching the bridging leaflets to the VSD patch



Two Patch Technique

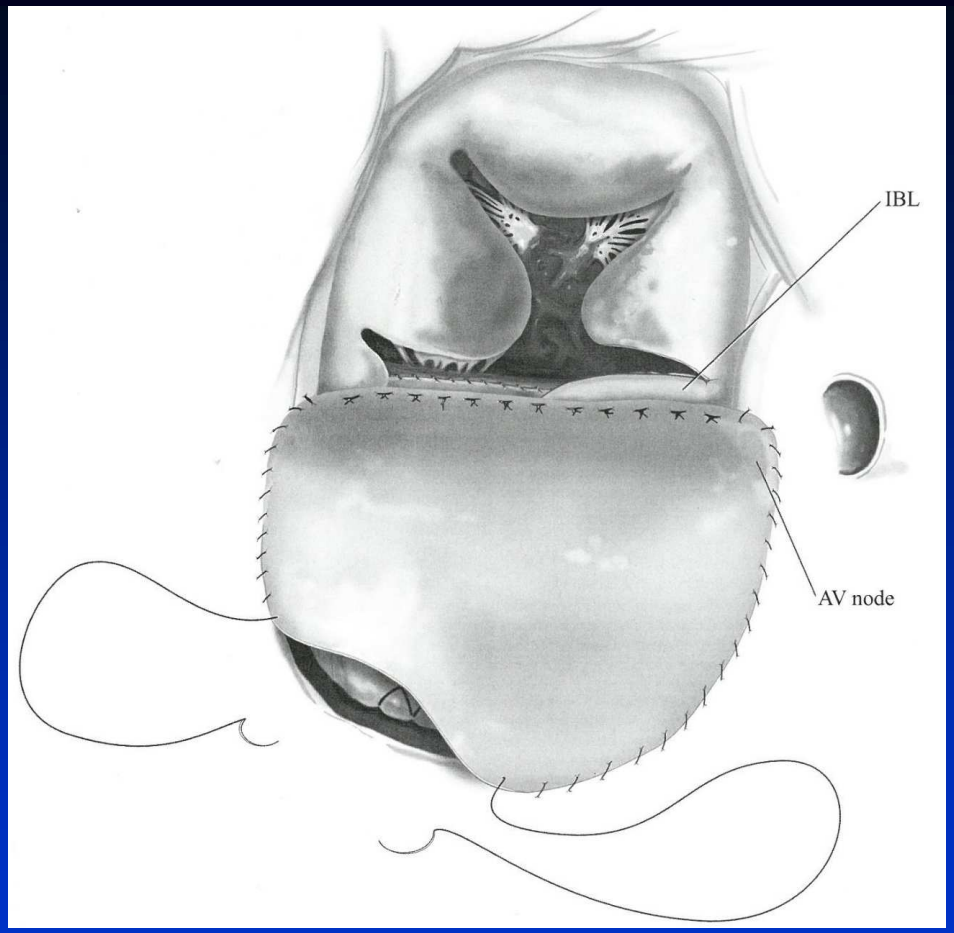
Closing the "cleft' or "zone of apposition"



Two Patch Technique

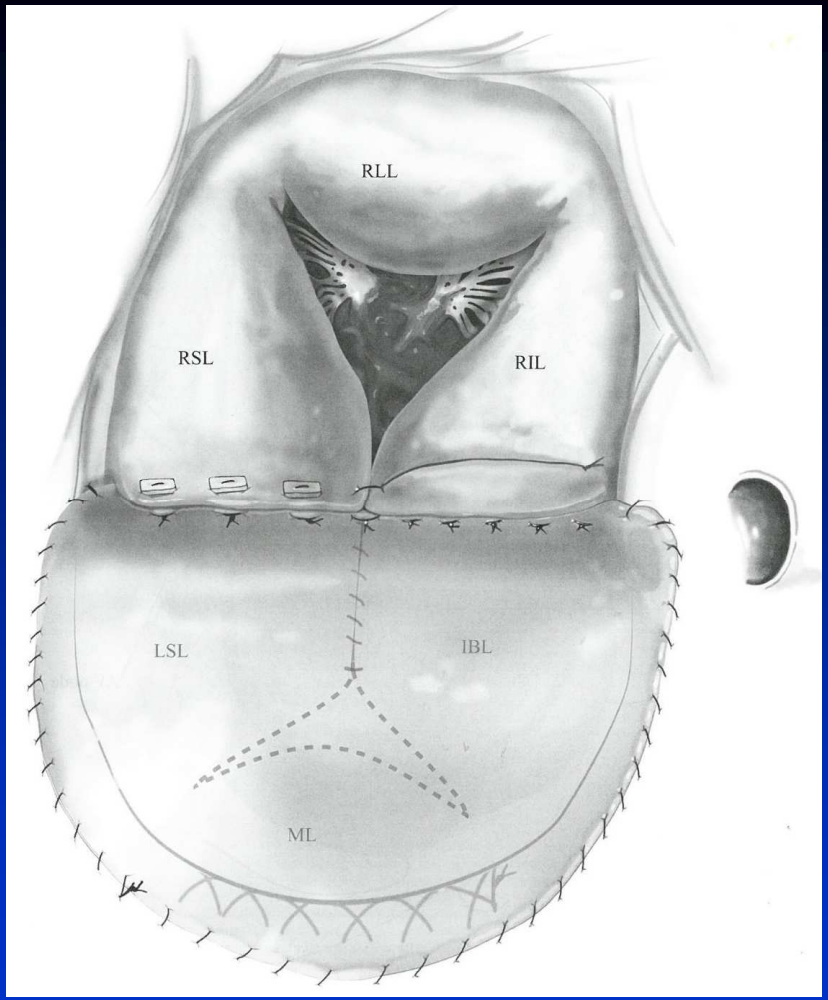
ASD Patch

Autologous pericardium, bovine pericardium



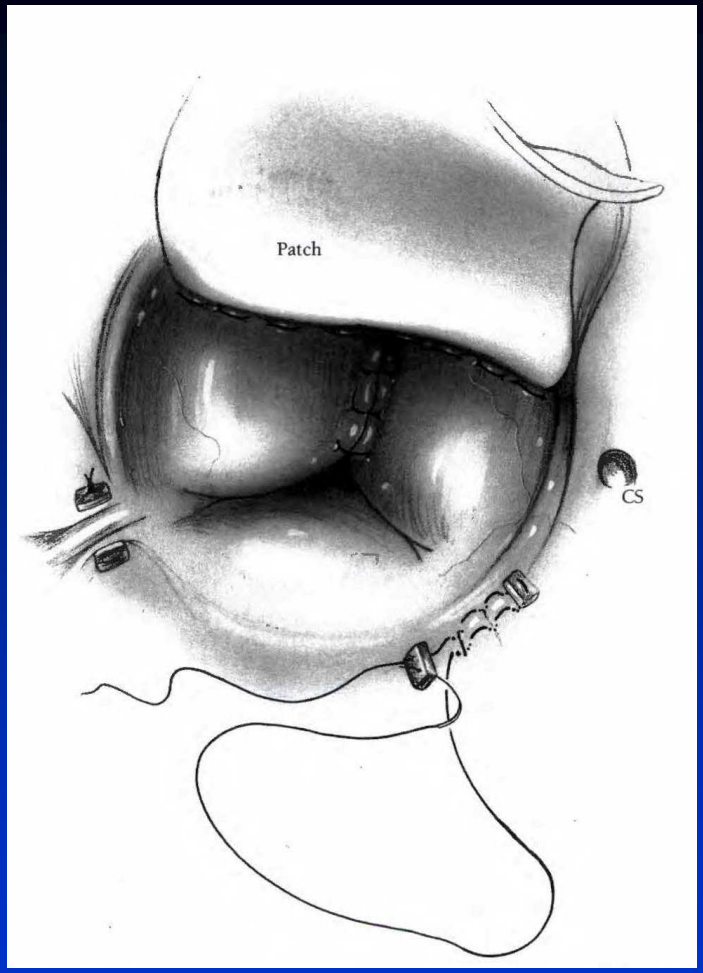
Two Patch Technique

Right sided component (“tricuspid”) AV Valve Repair



Additional AV Valve Repair Strategies

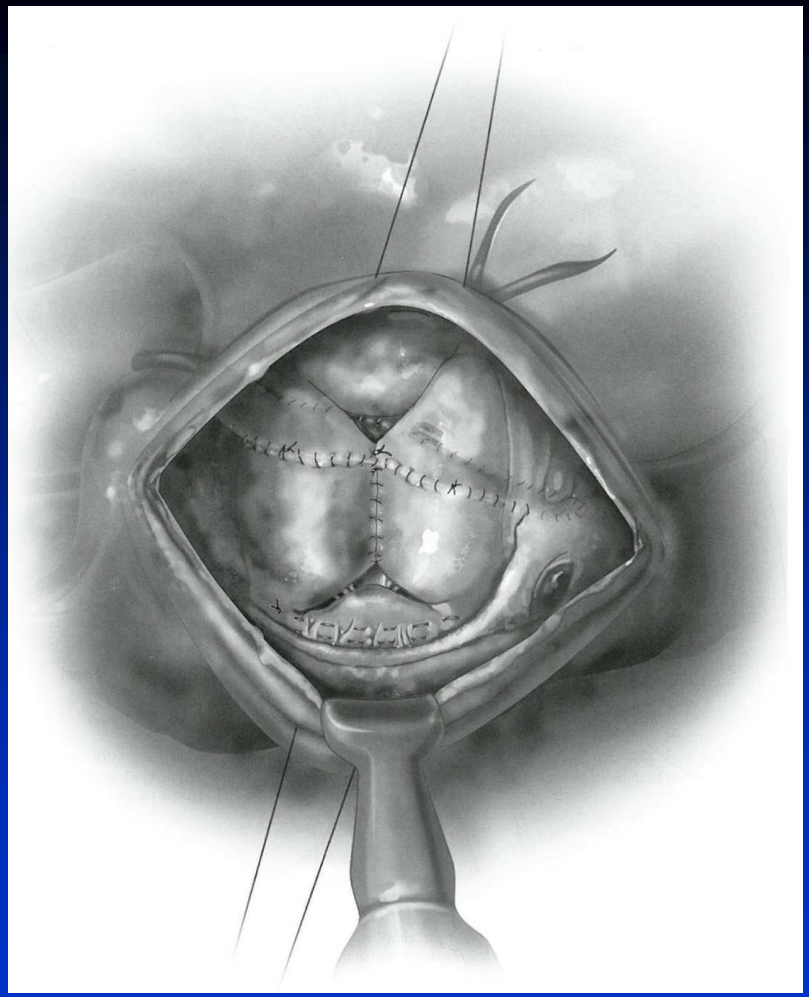
Commisuroplasty sutures



Crawford FA: *Oper Techn Thorac Cardiovasc Surg* 9: 221-239

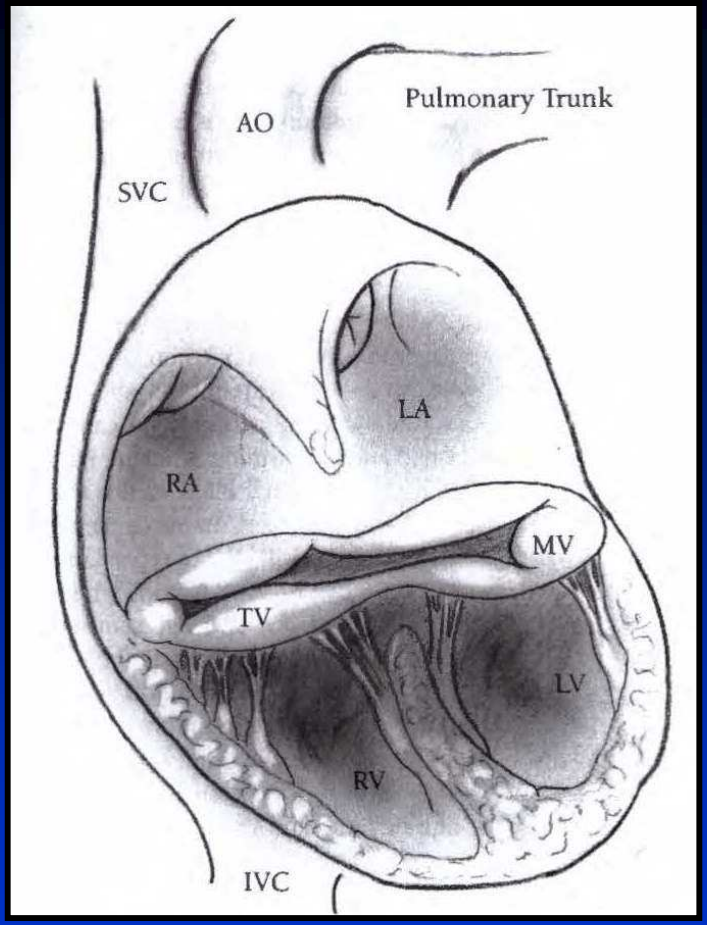
Additional AV Valve Repair Strategies

Mural leaflet annuloplasty



Single Patch Technique

Cutaway of CAVC defect



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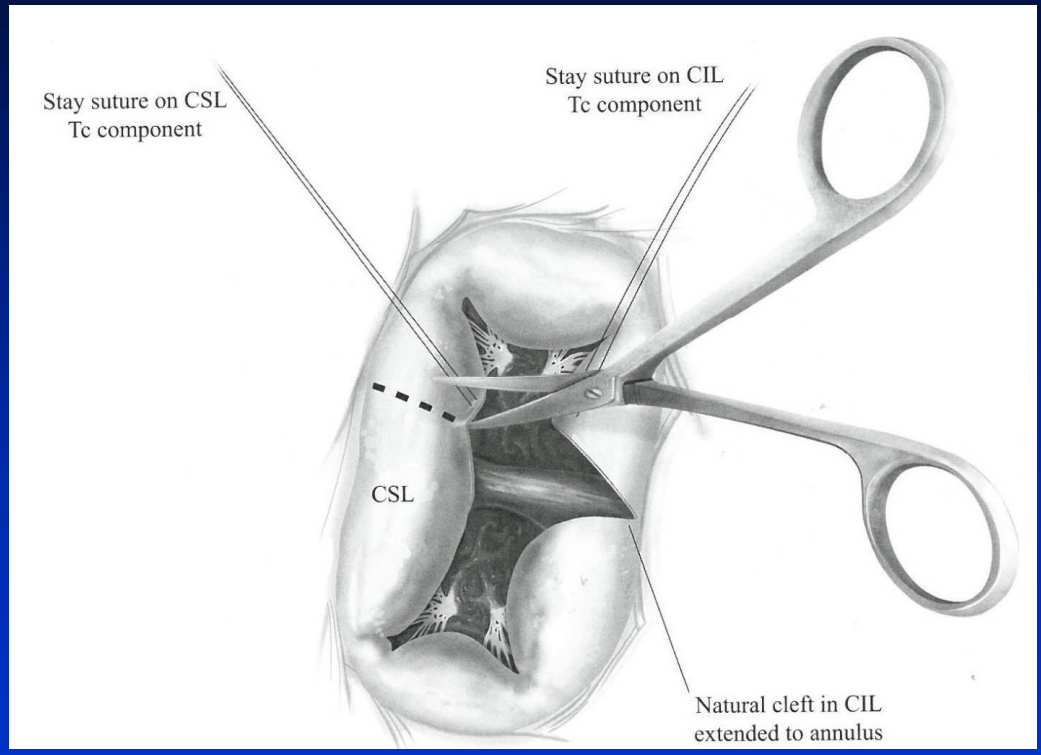
Single Patch Technique

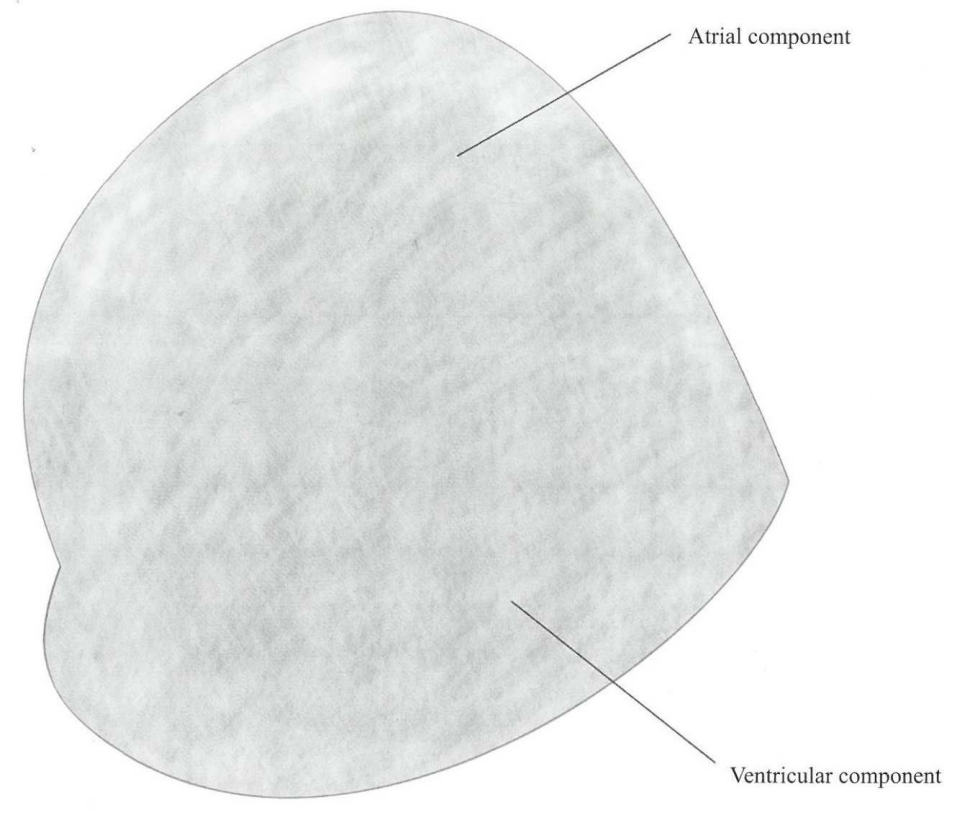
Division of the common superior AV valve leaflet



Single Patch Technique

Shape of the single patch

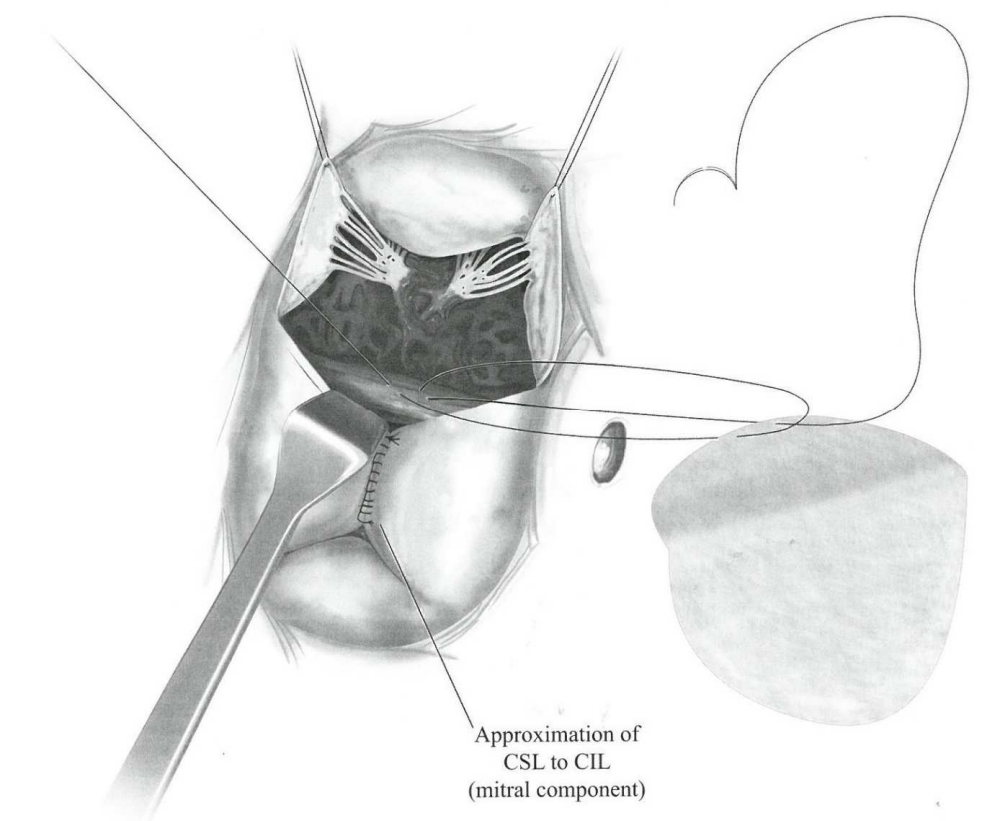
Bovine pericardium, fixed autologous pericardium, double velour Dacron patch



Single Patch Technique

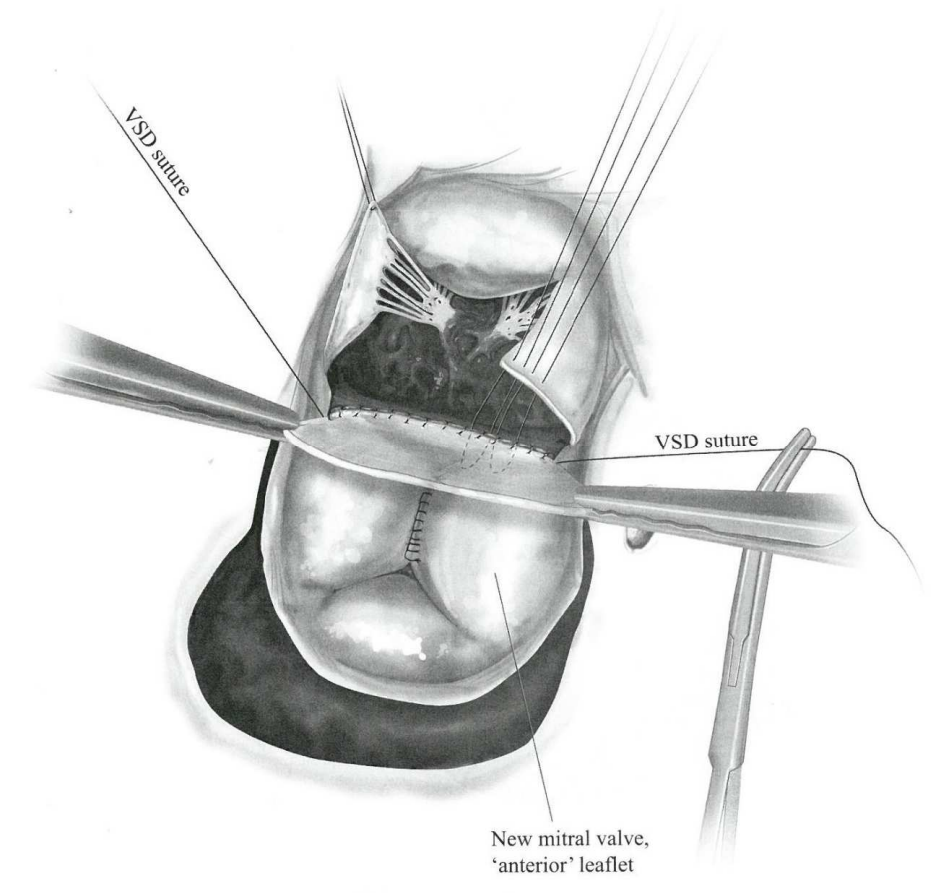
Closer of the cleft on the left side (“mitral component”) of the common AV valve

Suturing of patch to the crest of the VSD



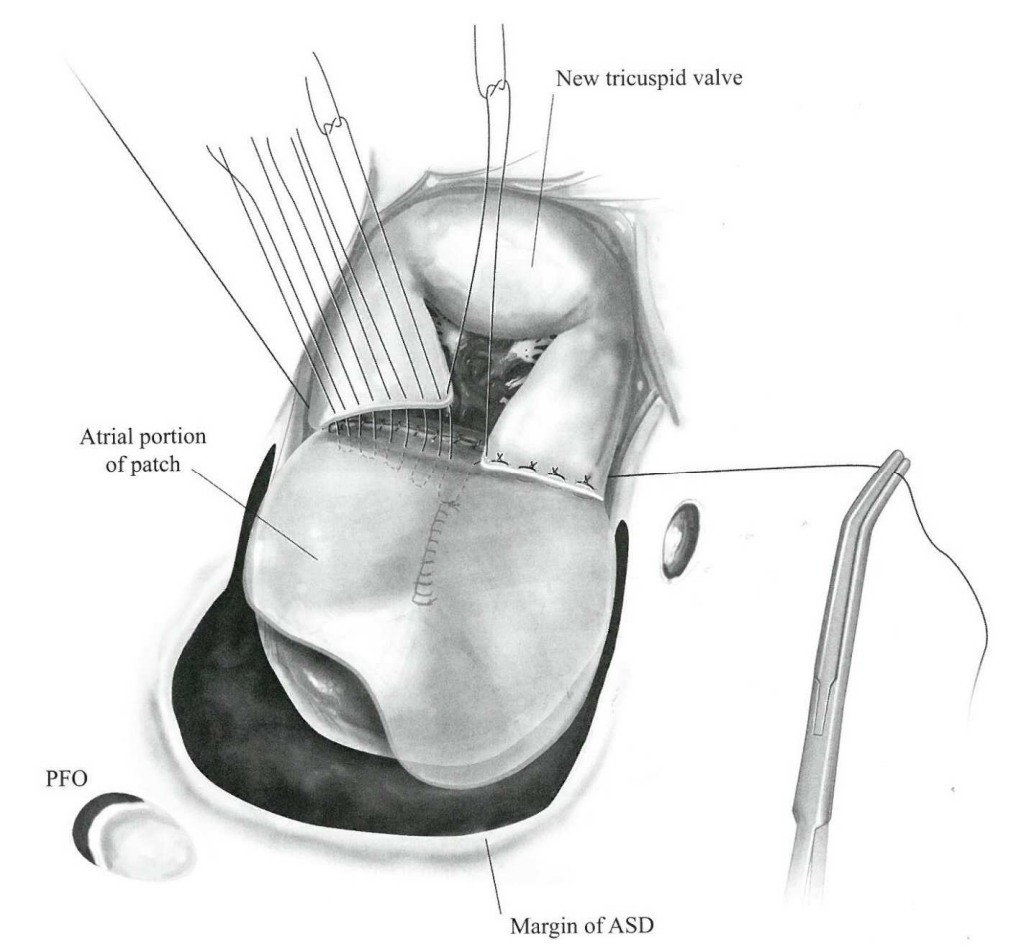
Single Patch Technique

Left and right AV valve components (“mitral” and “tricuspid” components respectively) are attached to the septation patch



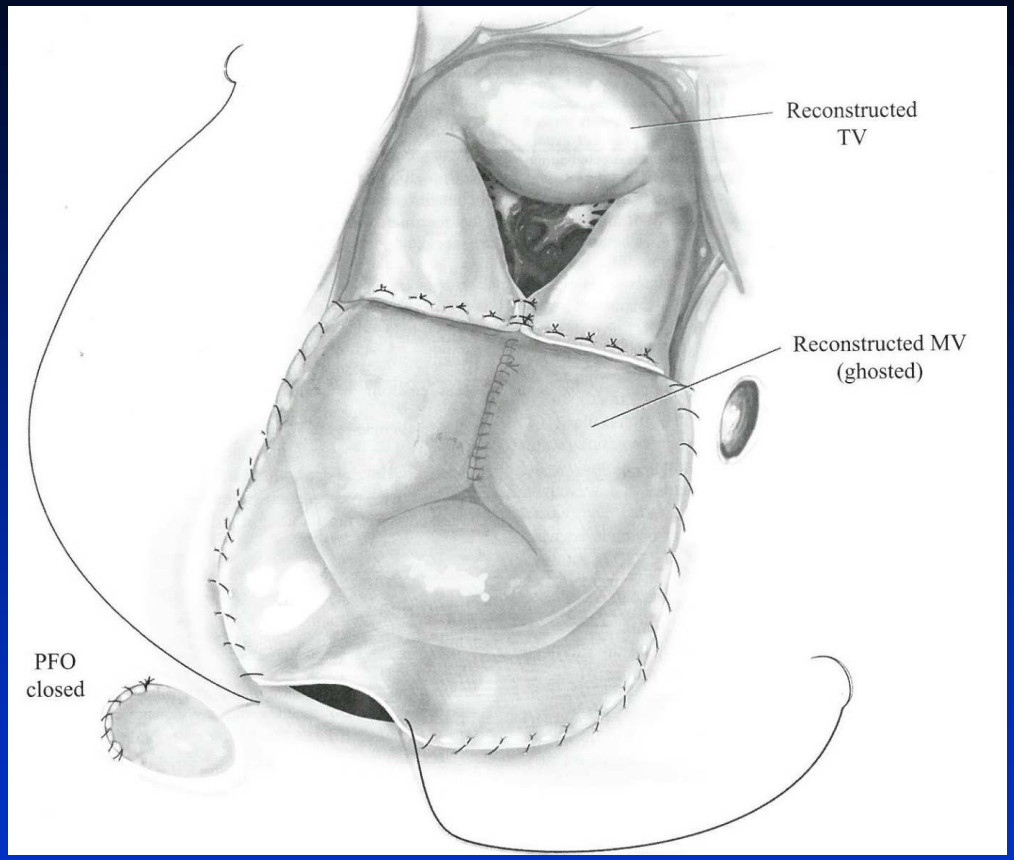
Single Patch Technique

Completion of the attachment of the left and right components of the divided AV valve



Single Patch Technique

ASD component is closed with the same patch, +/- incorporating the PFO or secundum ASD



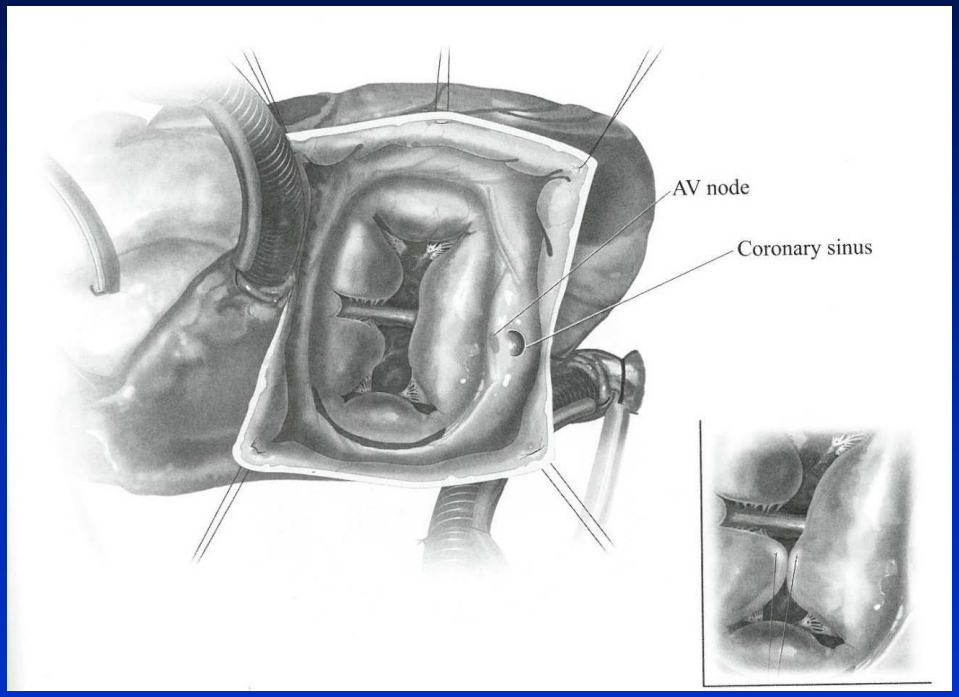
No VSD Patch Technique

"One Who Goes By Many Names!"

Nunn repair,
Australian Technique,
Modified Single Patch Technique

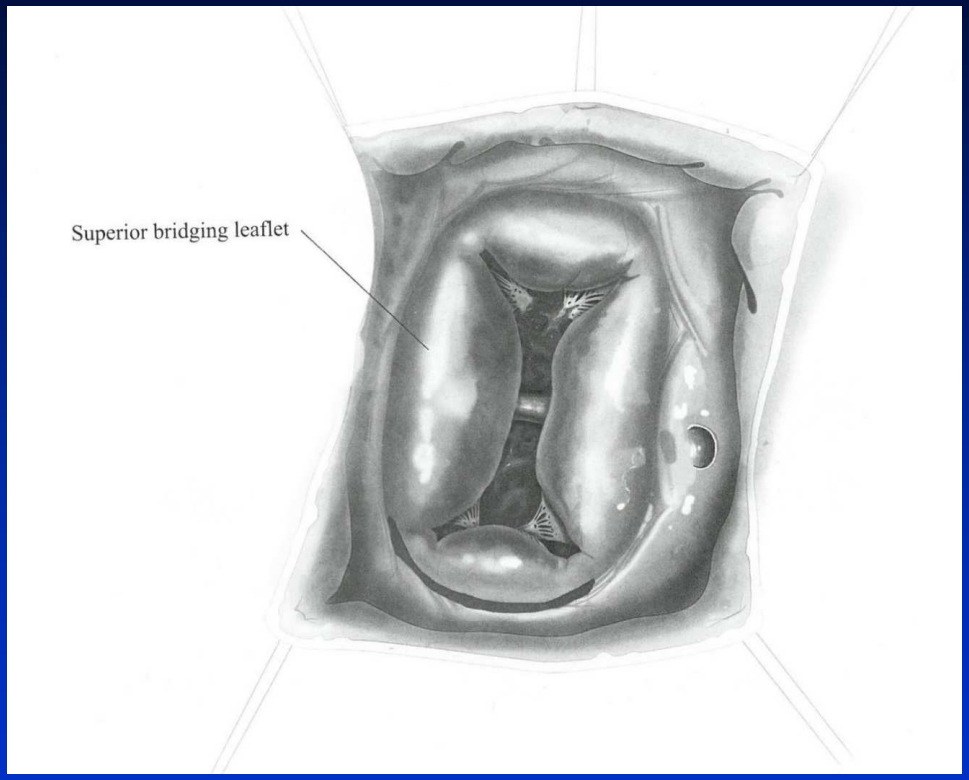
No VSD Patch Technique

Rastelli Type A

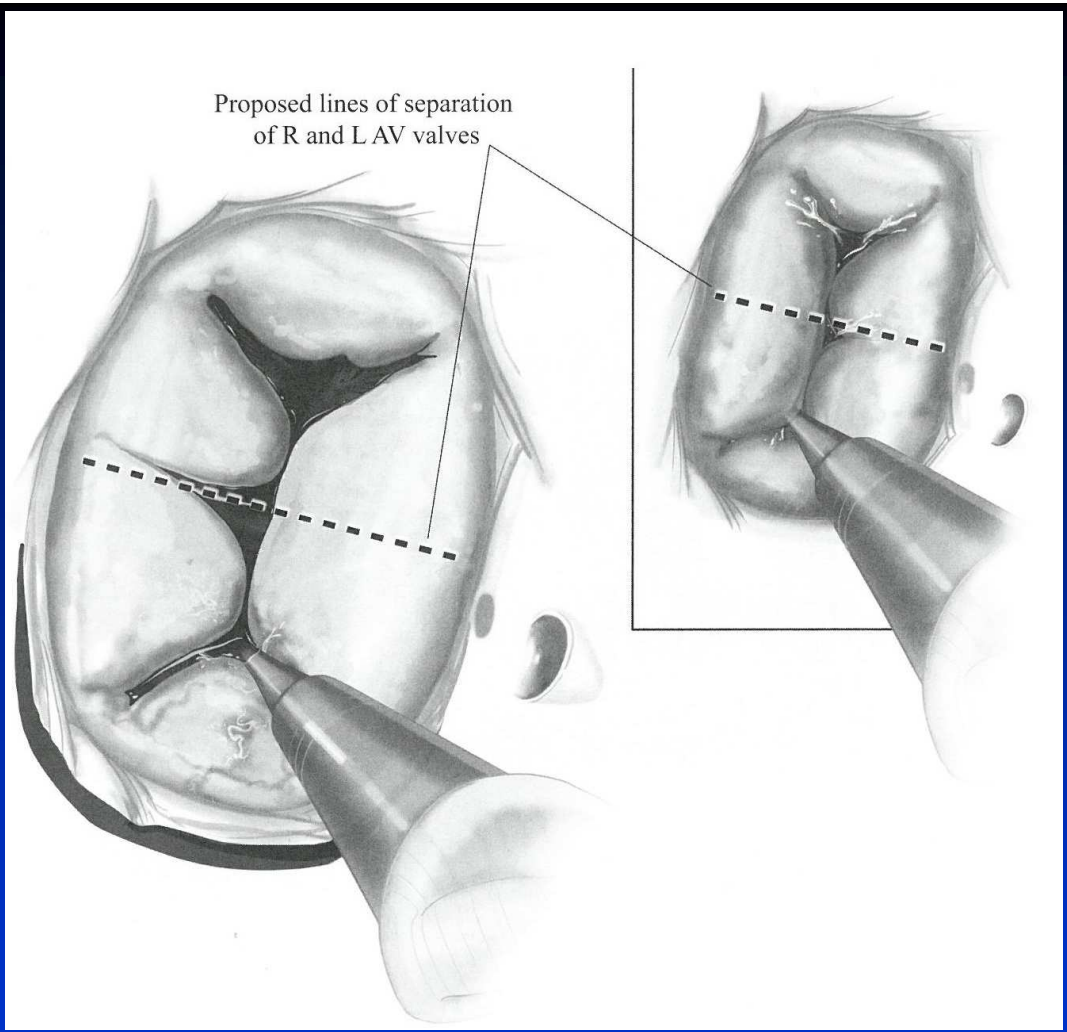


No VSD Patch Technique

Rastelli Type C

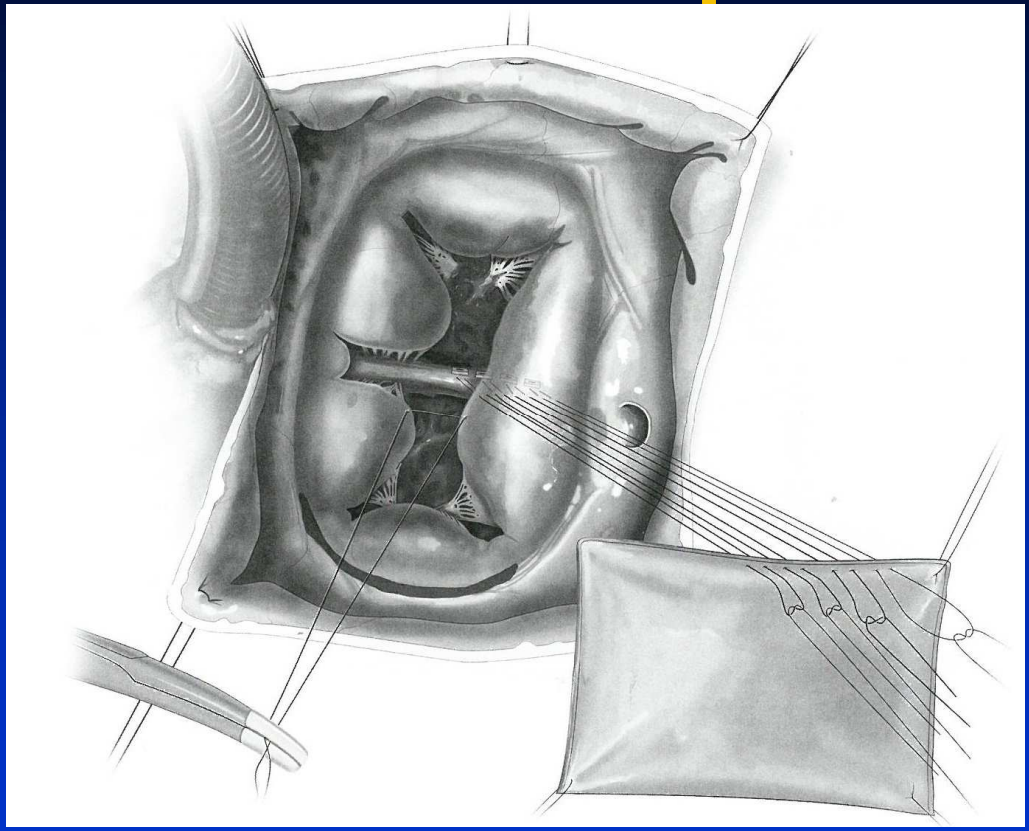


No VSD Patch Technique



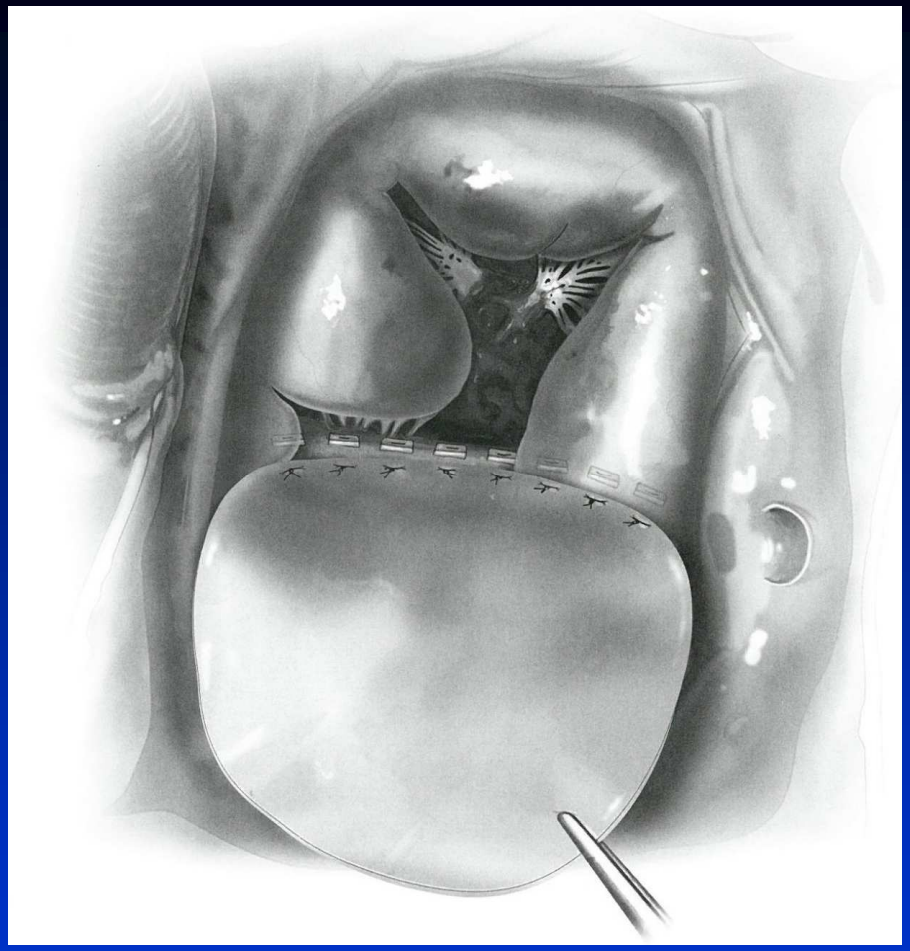
No VSD Patch Technique

Pledgeted horizontal mattress sutures placed on the right side of the ventricular septum and then directly to the “middle” of common AV valve, and then to the pericardial ASD patch



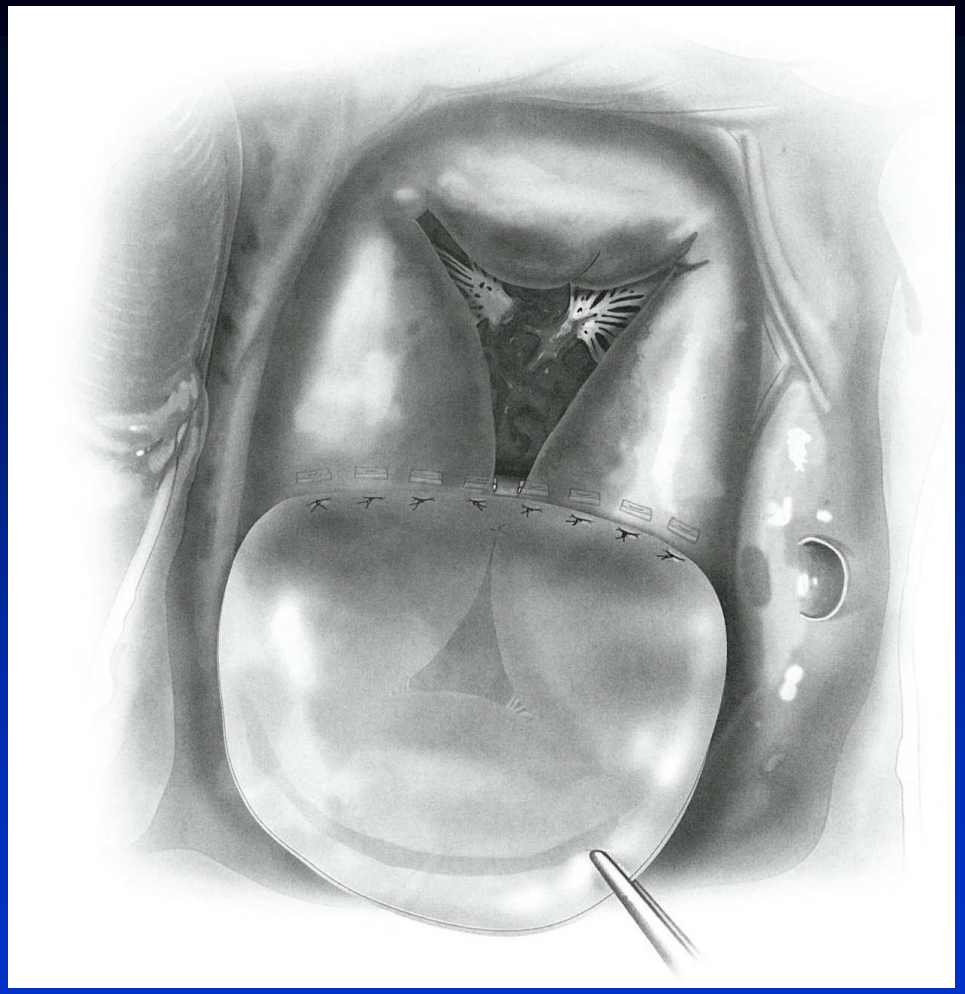
No VSD Patch Technique

VSD is closed directly with sutures then passing through only inferior side of AV valve (Rastelli A) and ASD patch



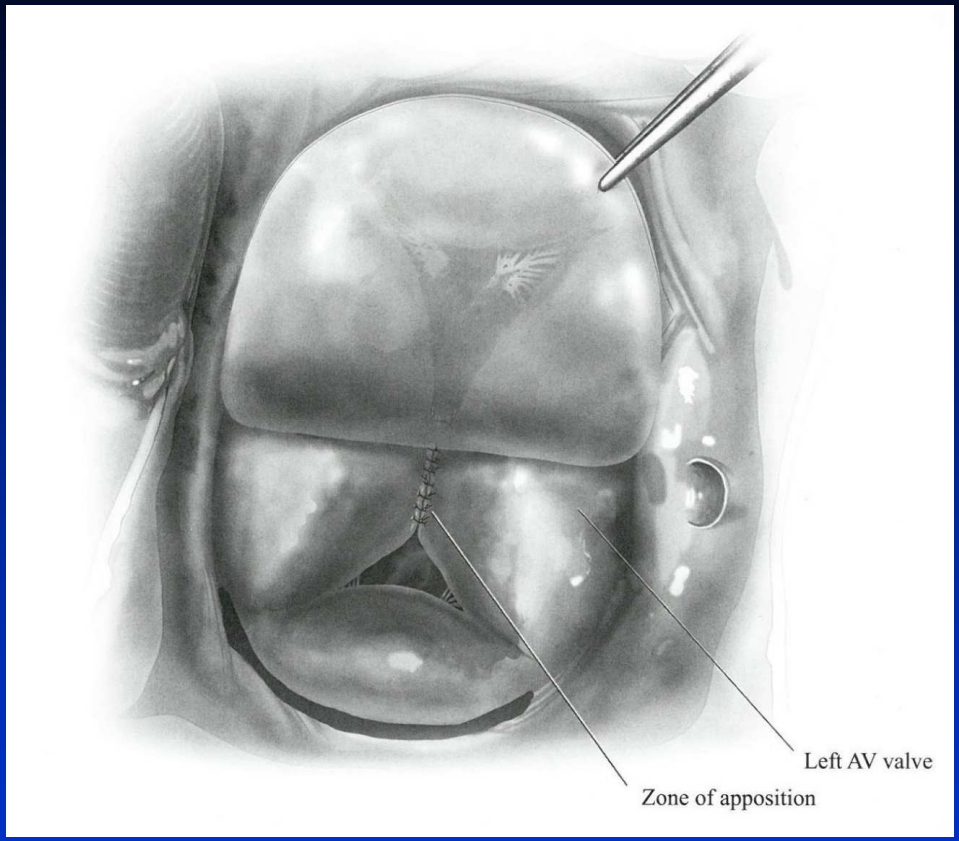
No VSD Patch Technique

VSD is closed directly with sutures then passing through full length of AV valve (Rastelli C) and ASD patch



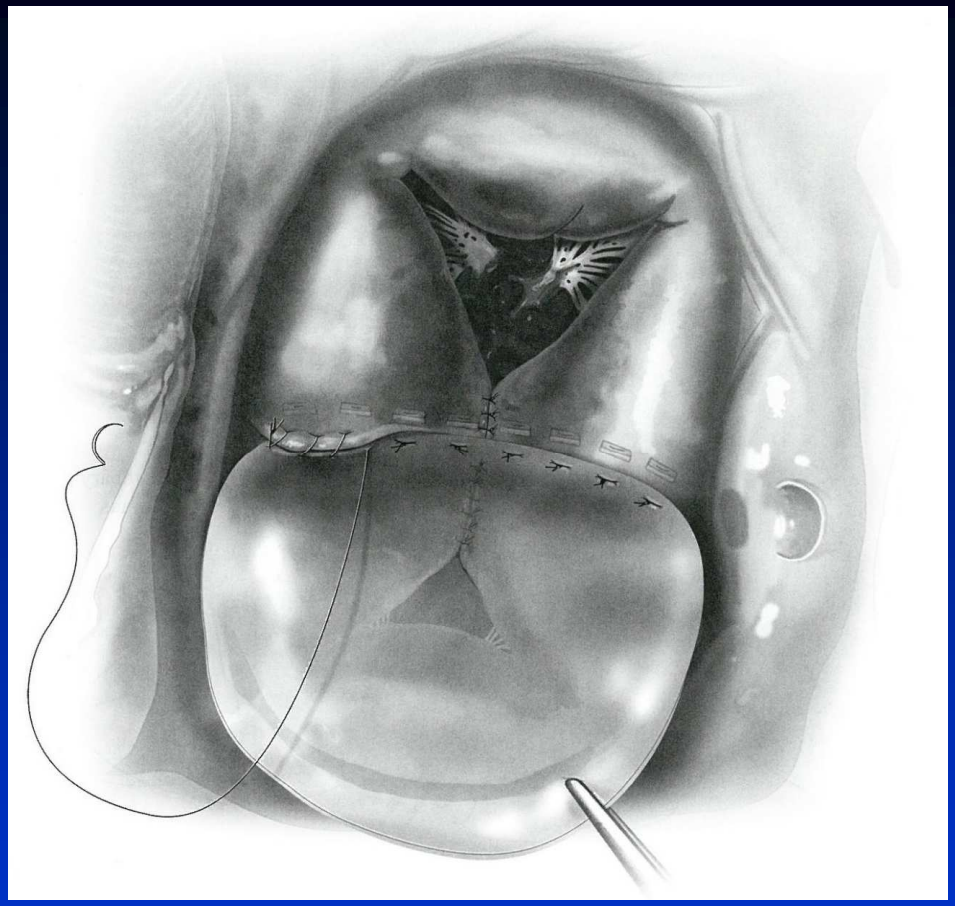
No VSD Patch Technique

Closure of the cleft or zone of apposition



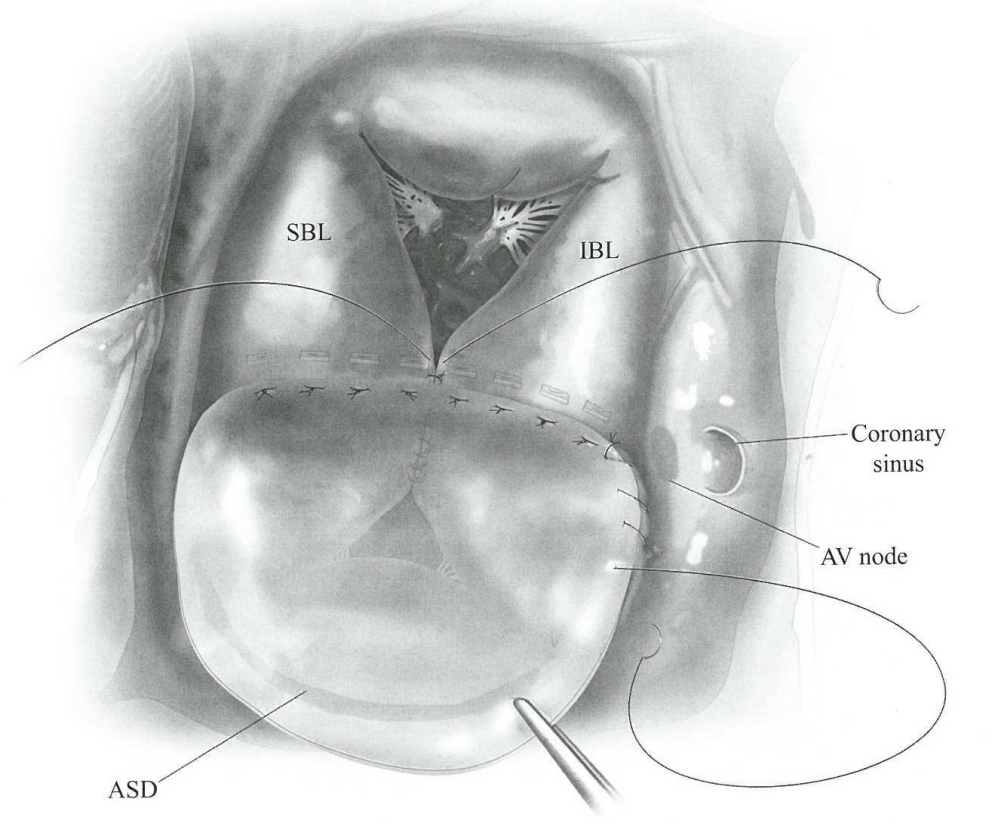
No VSD Patch Technique

Superior bridging leaflet is suspended to the patch (Rastelli A)



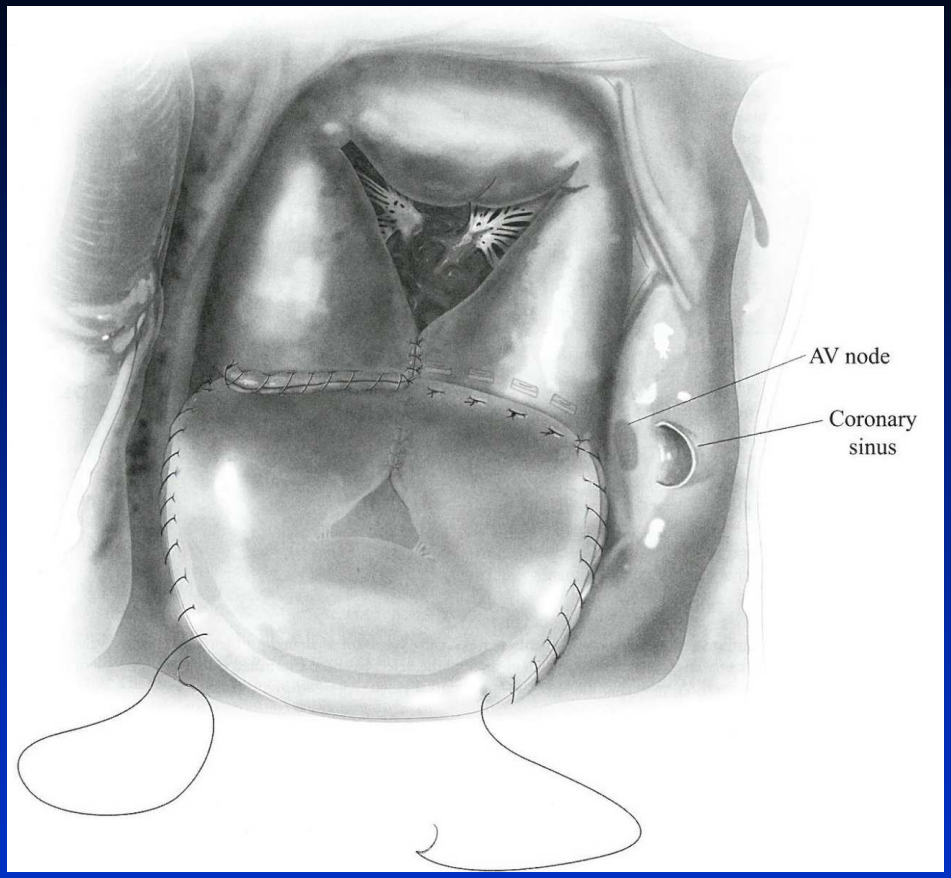
No VSD Patch Technique

Closure of right sided "zone of apposition"

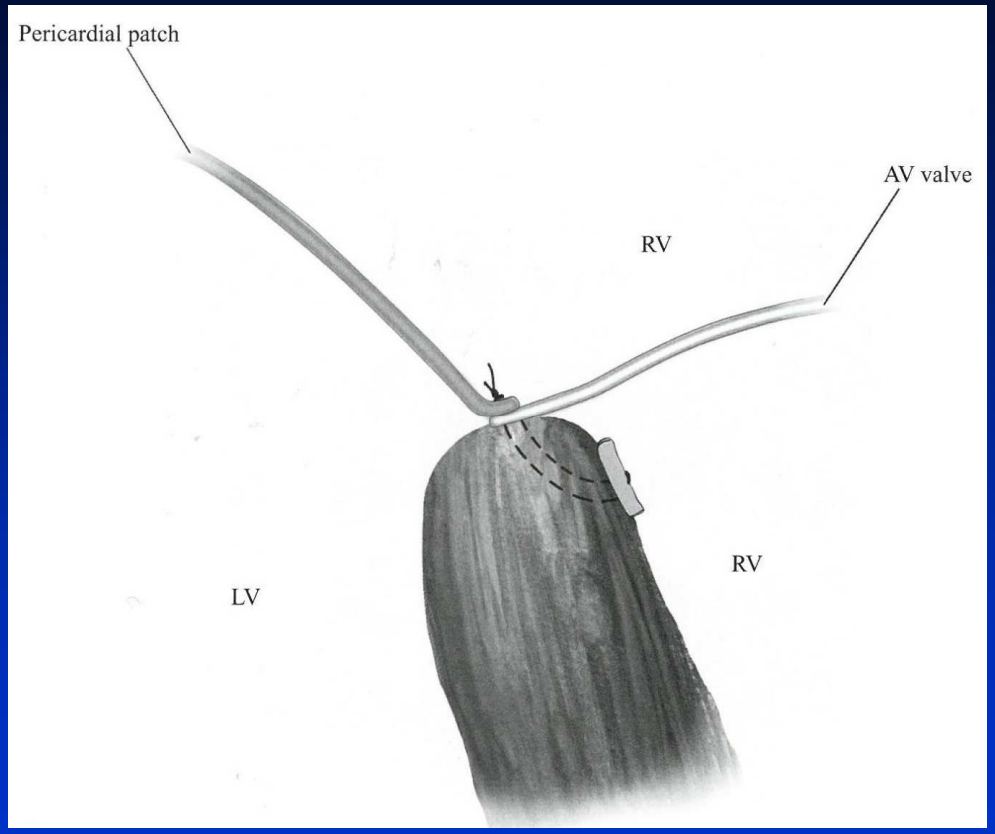


No VSD Patch Technique

Atrial portion of the defect is closed

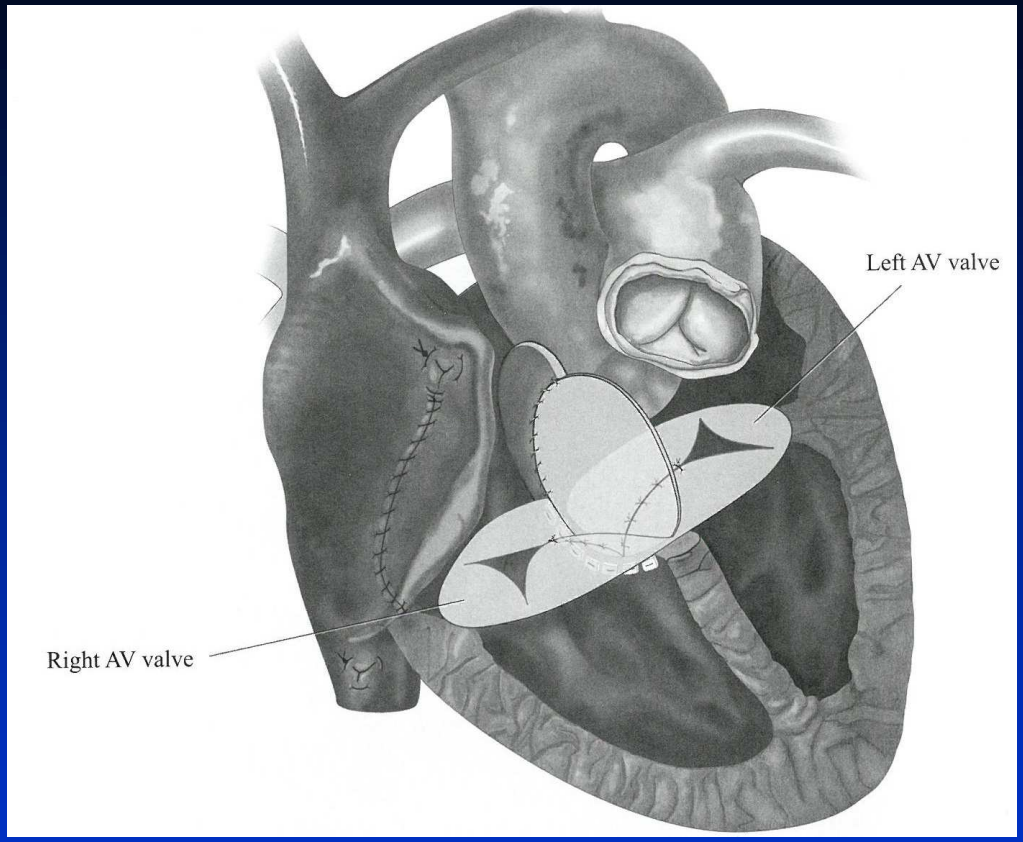


No VSD Patch Technique



No VSD Patch Technique

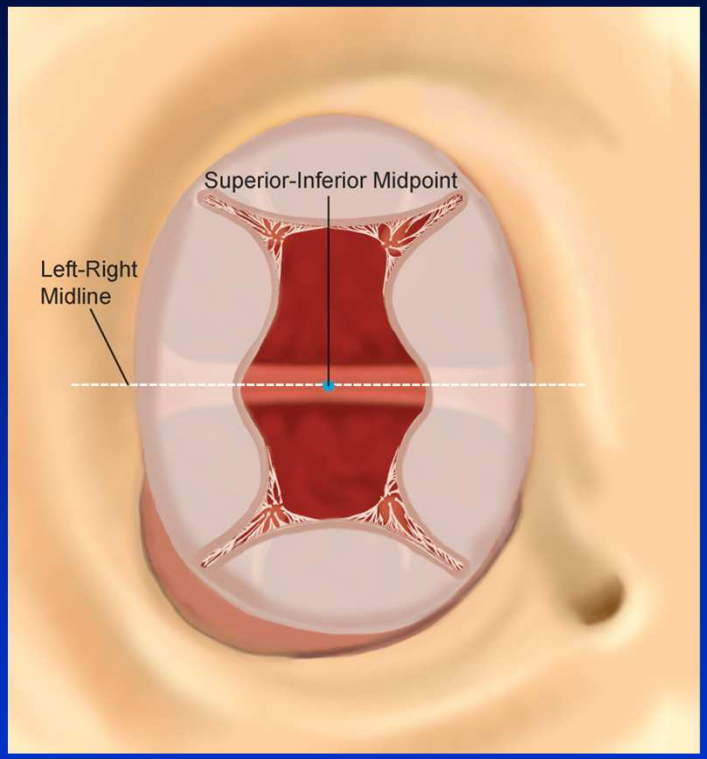
Completed procedure in a cut-a-way view



Central Patch Technique

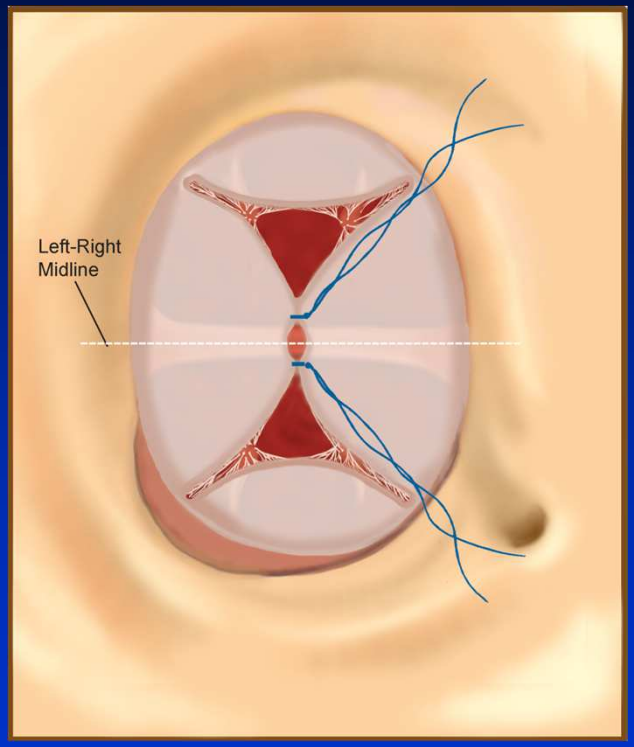
- Described by Douglas (*World J Pediatric Congenit Heart Surg. 2014;5(3) 434-439*)
- Introduced as a technique with a shorter learning curve for junior surgeons
- Additional advantage of adding tissue to AV valves and allowing additional degree of freedom for positioning AV valves (i.e. adjusting midpoint of AV valves for a mildly unbalanced defect)

Central Patch Technique



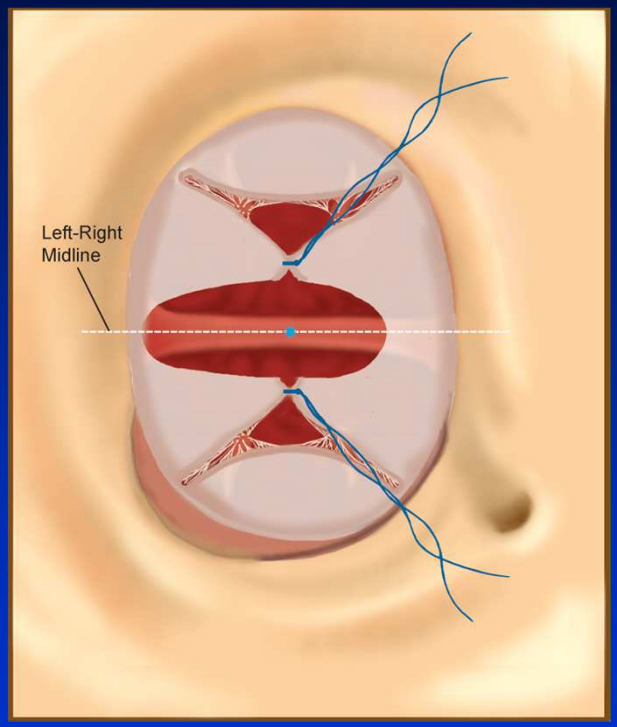
Central Patch Technique

Superior and inferior bridging leaflets are brought together to at the ”kissing points" just off the midline



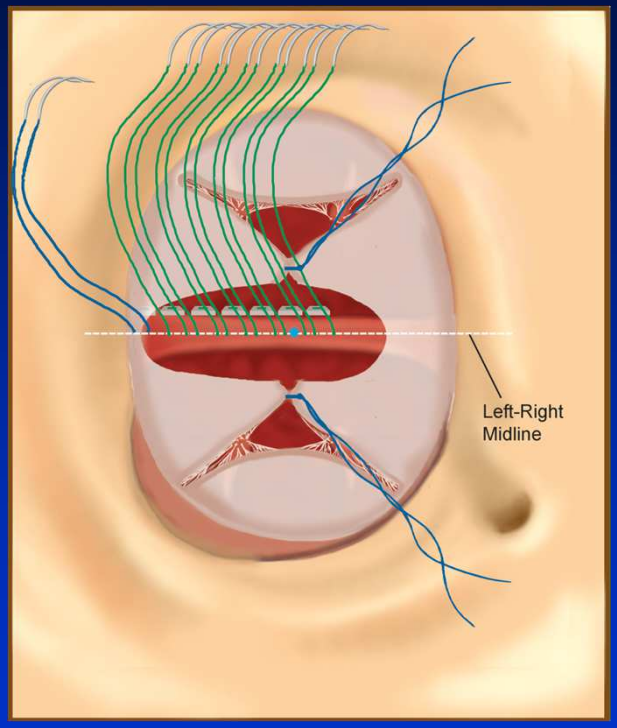
Central Patch Technique

Bridging leaflets are incised along the left-right midline



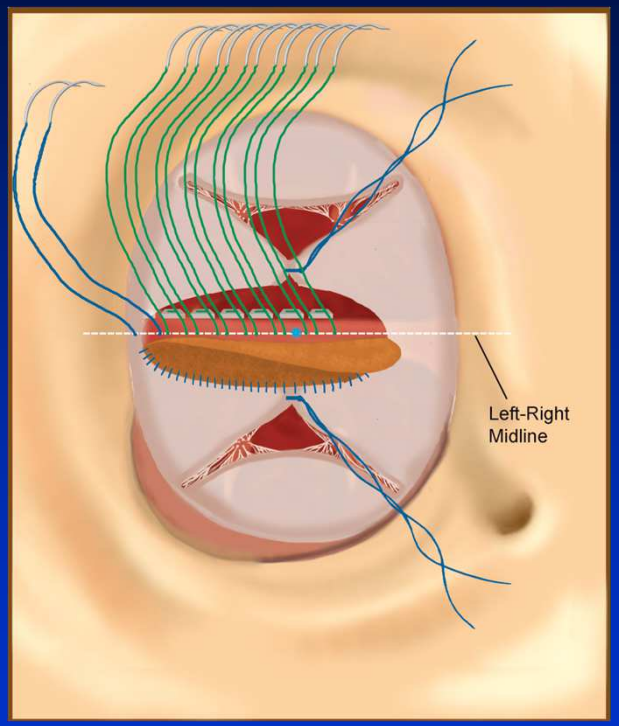
Central Patch Technique

VSD sutures are placed through the right side of the ventricular crest (superior-most sutures are passed through the superior AV valve ring)



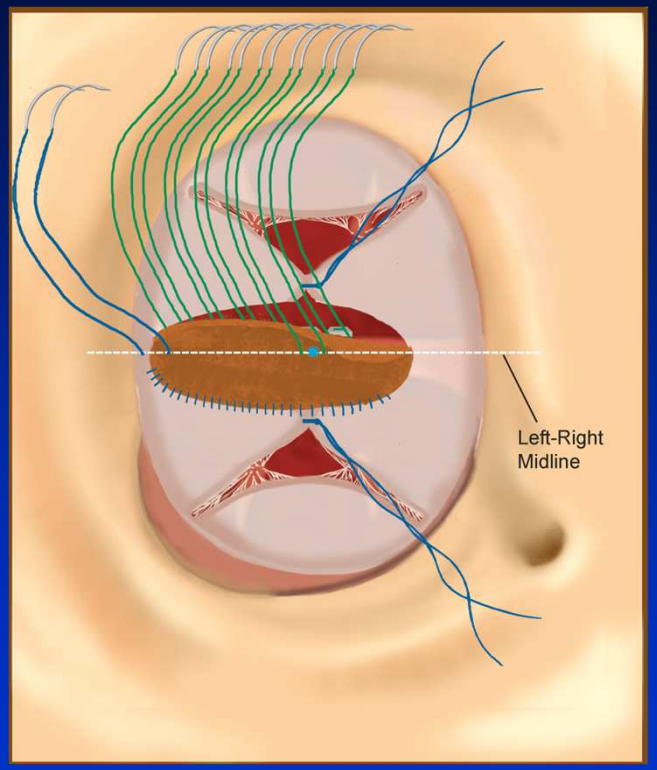
Central Patch Technique

A central patch (fixed autologous pericardium) is sewn to the cut end of the left AV valve tissue



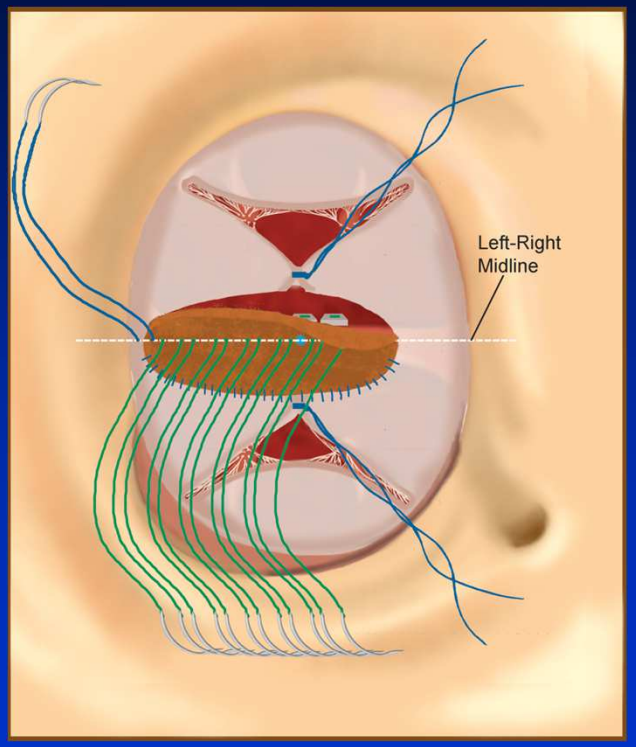
Central Patch Technique

The VSD suture at the superior-inferior midpoint is placed through the midpoint of the central patch



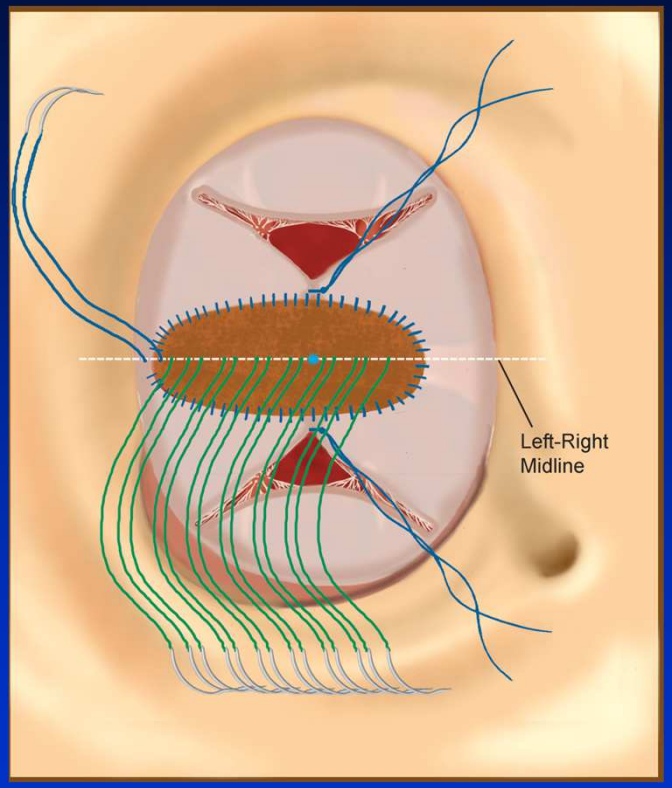
Central Patch Technique

Remaining VSD sutures are placed through the central patch



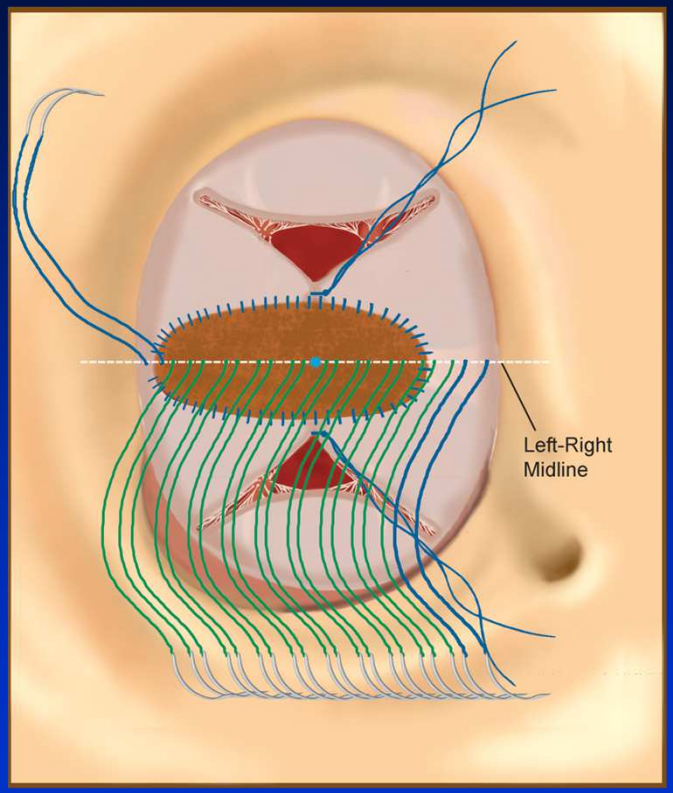
Central Patch Technique

The central patch is then sewn to the right side of the AV valve tissue



Central Patch Technique

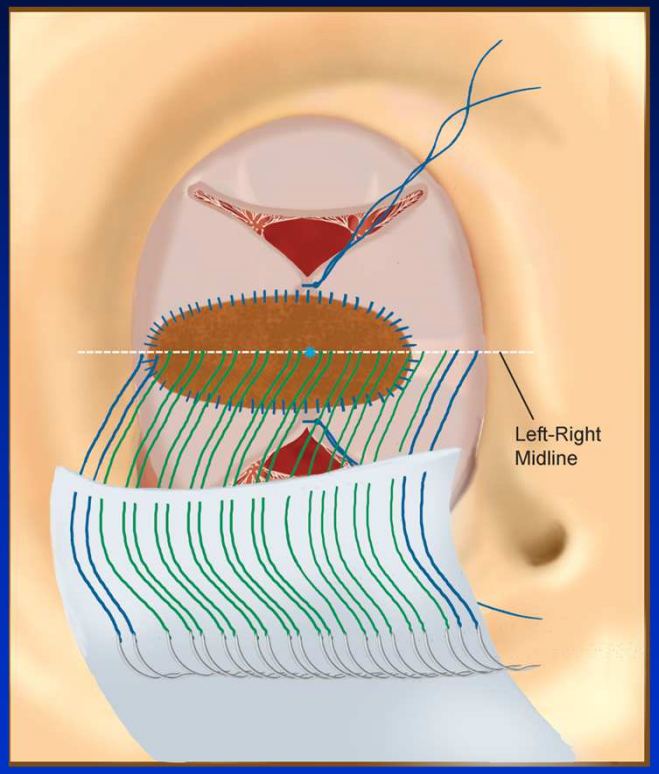
The inferior-most VSD sutures are passed the the inferior septum and AV valve tissue



Central Patch Technique

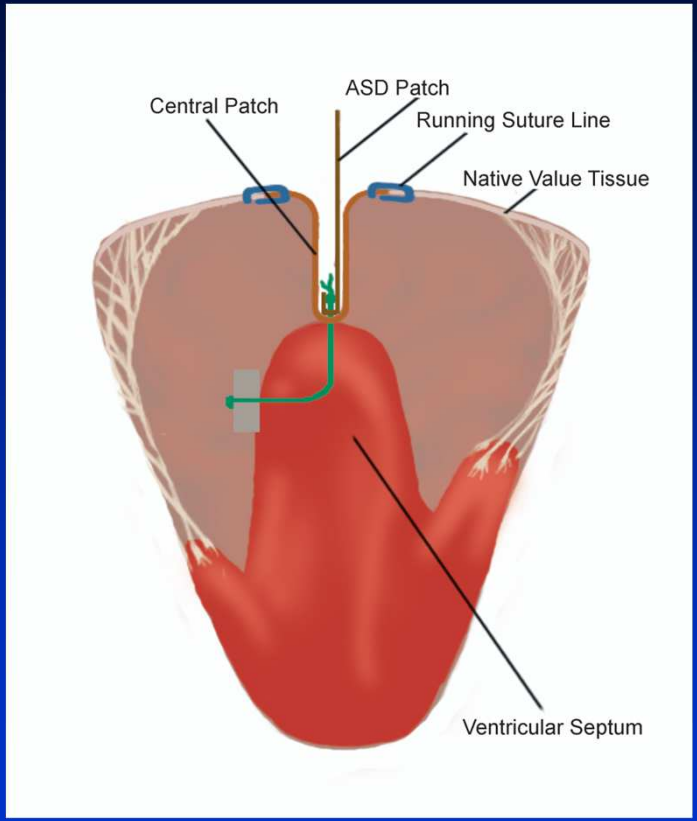
The VSD sutures are placed through the edge of the ASD patch (autologous pericardium)

The cleft closure and any right AV valve repair are performed in a manner similar to traditional techniques



Central Patch Technique

Cross-sectional view showing AV valve tissue at appropriate height above the ventricular crest and augmentation of the central AV valve tissue

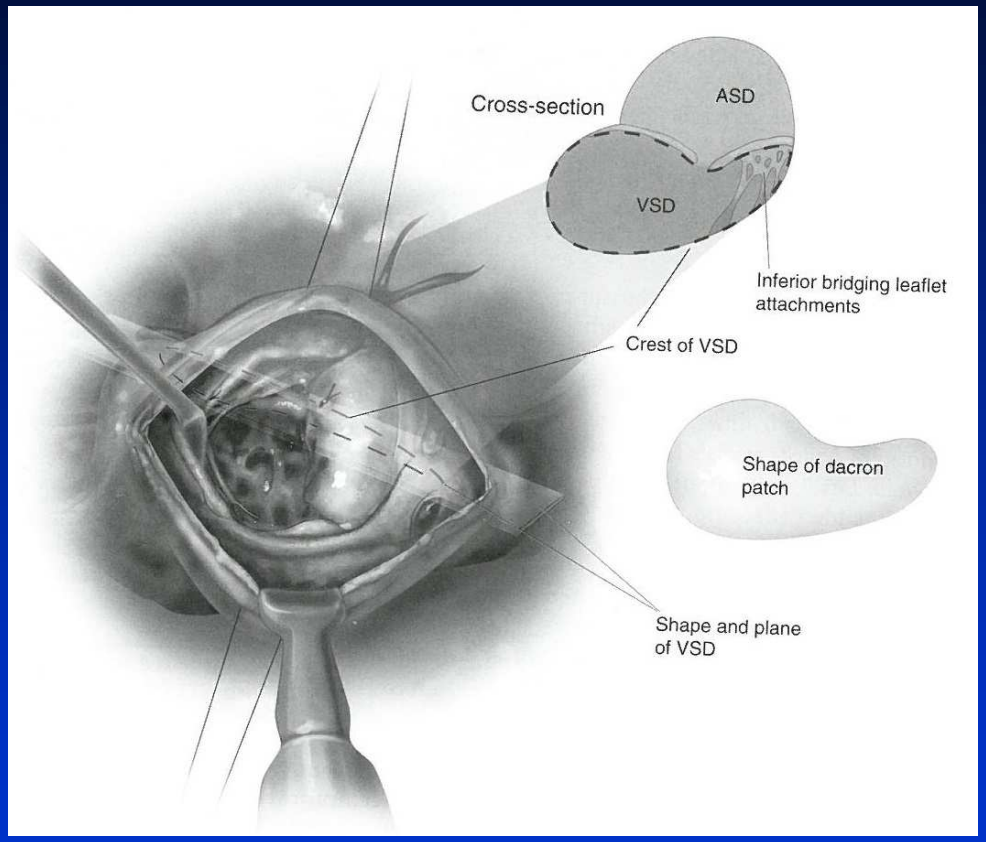


Tetralogy of Fallot with Common AV Canal Defect

- Estimated at 6%-10% of patients with CAVC
- High incidence of Down's syndrome (60-90%)
- Rastelli C is the predominant type of CAVC with TOF
- Can repair with either a single patch of two path technique

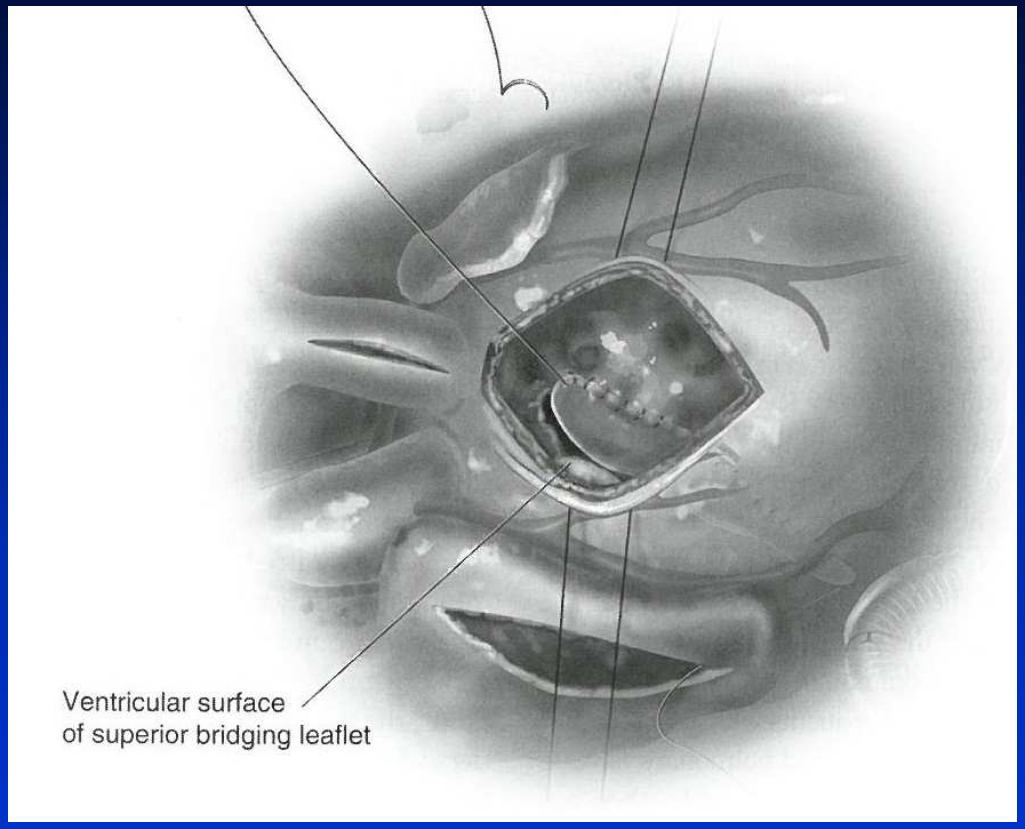
TOF with CAVC

Need to adjust the shape of the VSD patch to allow for closure of the malalignment component of the VSD



TOF with CAVC

The superior portion of the VSD can be closed via the infundibulotomy



STS Congenital Heart Surgery Database
(2013-2016; 3049 CAVC Repairs)

- Median age at repair: 4 months
- Down syndrome: 66%
- Median CPB Time: 127 minutes
- Median cross-clamp time: 93 minutes

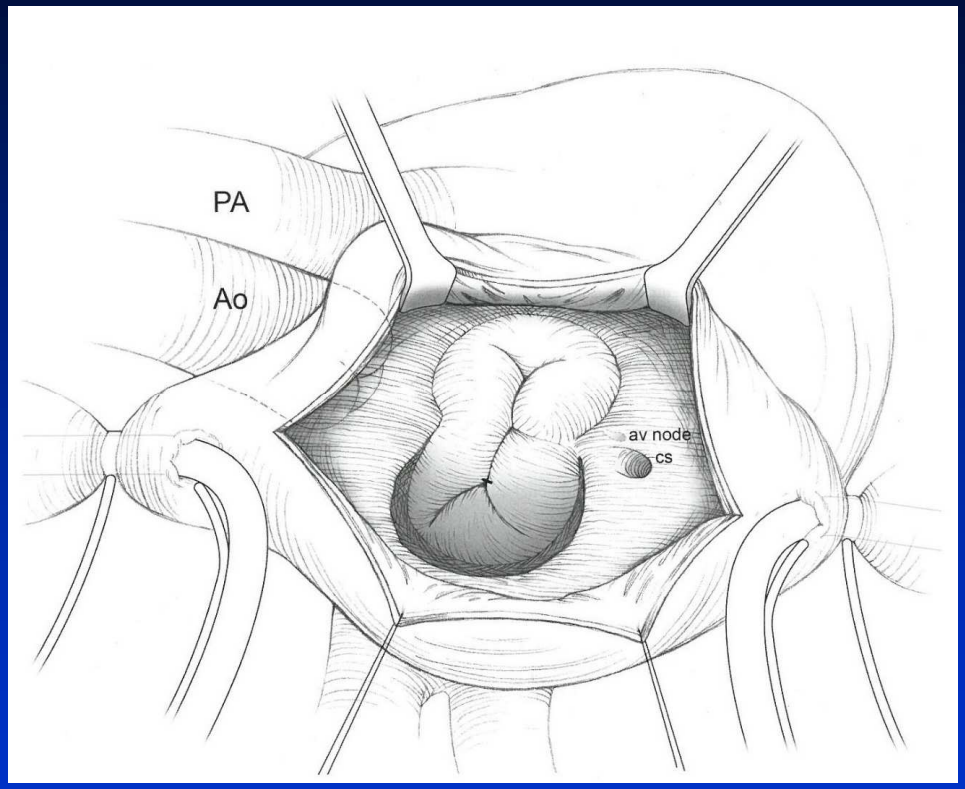
STS Congenital Heart Surgery Database
(2013-2016; 3049 CAVC Repairs)

- Mortality: 2.5%
- Need for mechanical circ. support: 2.1%
- Unplanned cardiac reoperation: 6.3%
- Arrhythmia req permanent pacer: 2.6%
- Neurologic deficit: 0.4%

Basic Goals of Congenital Cardiac Surgery

- Close the hole
- Relieve the obstruction
- Stop the leakage
- Restore the pathway
- Create a bizarre and complex cardiopulmonary anatomy and physiology in a way nature never intended

Tetralogy of Fallot Repair with AV Canal Defect: One Patch Repair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