

The 2nd Contemporary Morphology Course  
Congenital Heart Disease in Your Hands  
December 6-7, 2019

# STRADDLING AND OVERRIDING ATRIOVENTRICULAR VALVES



Shi-Joon Yoo, MD

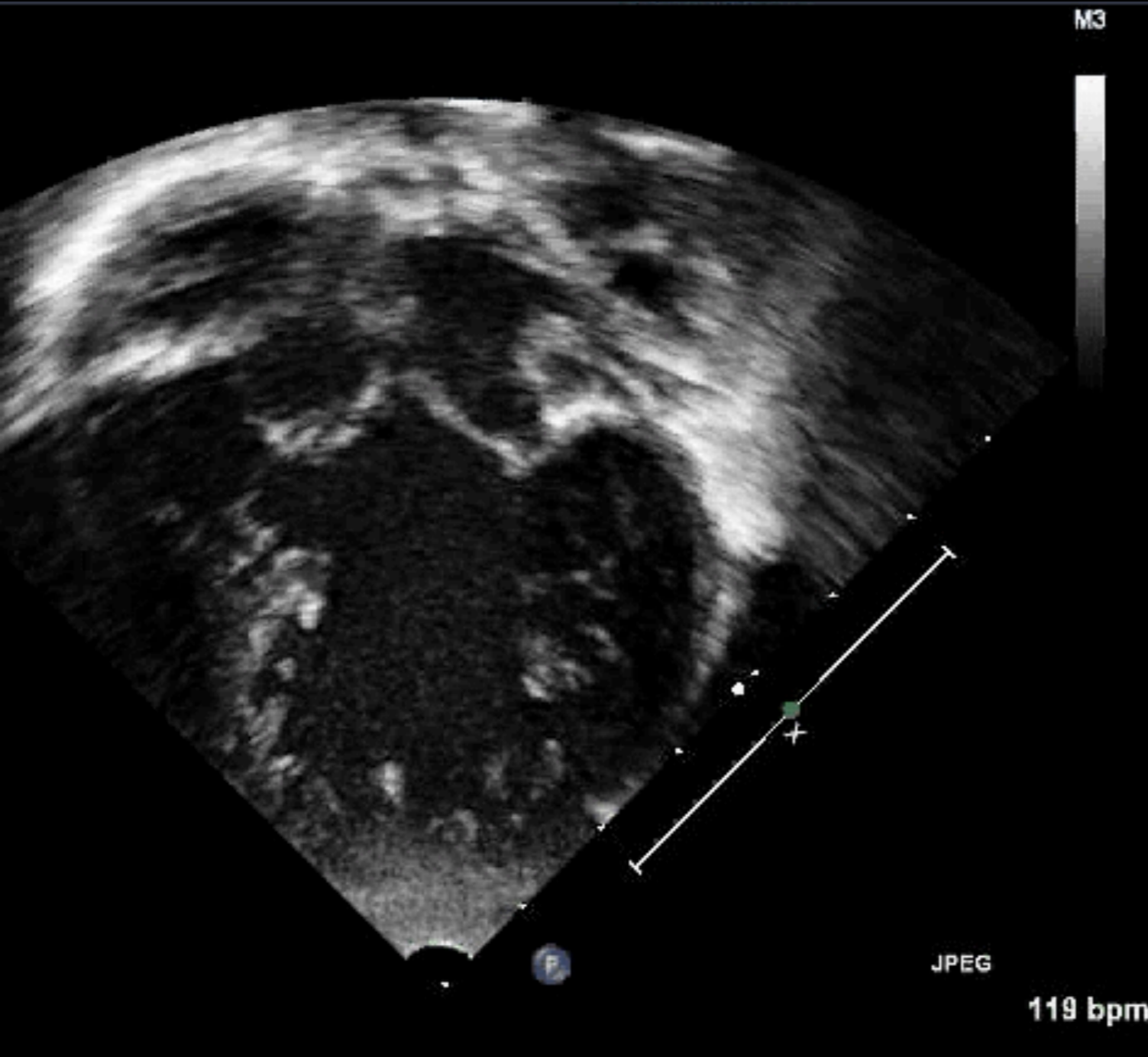
Mika Saito, MD

Andreea Dragulescu, MD

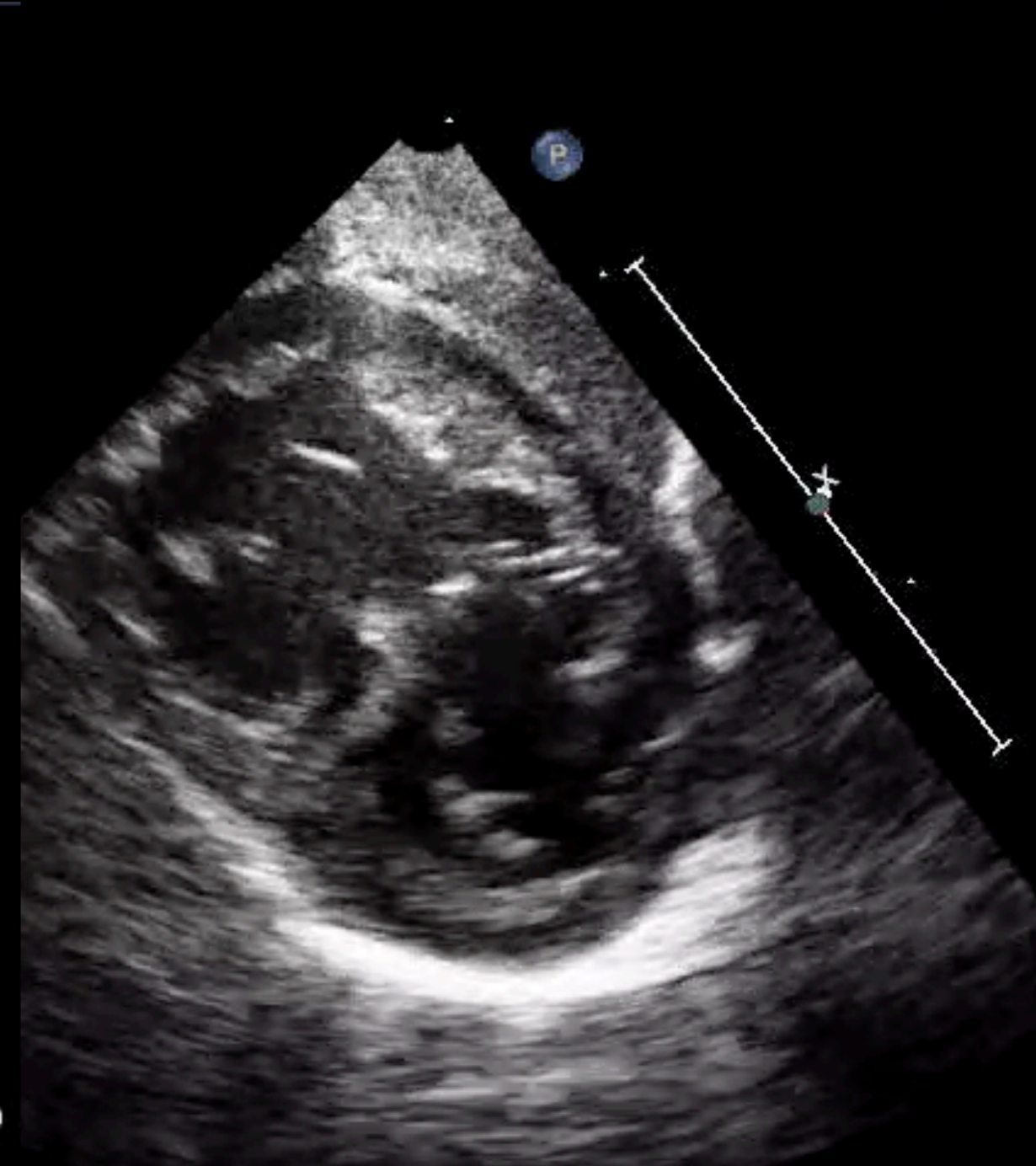
Department of Diagnostic Imaging and  
Division of Cardiology, Department of Paediatrics  
Hospital for Sick Children  
University of Toronto

Canada

**SickKids**



Case 1



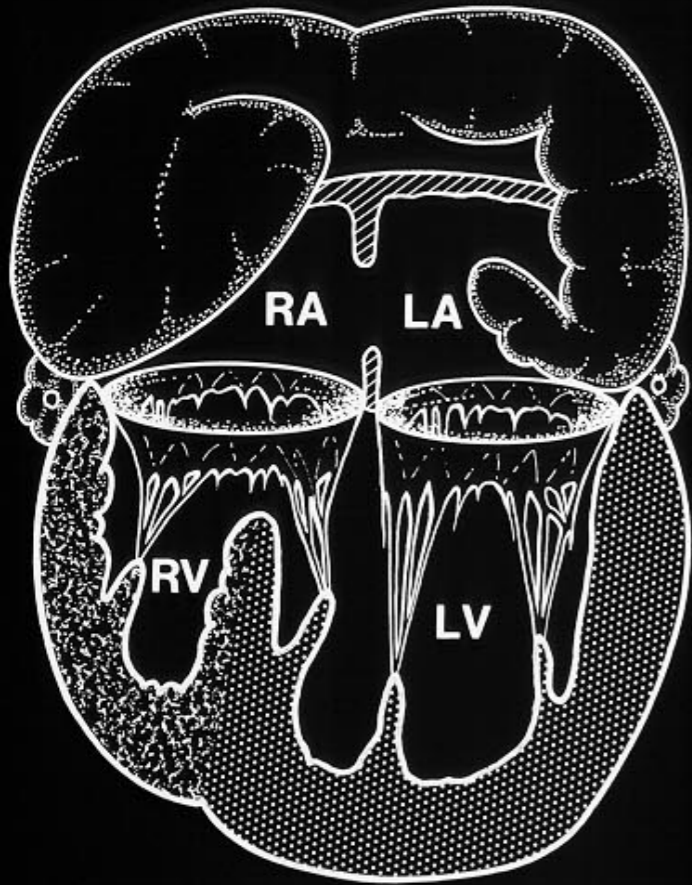
Case 2



# VSD'S IN STRADDLING AV VALVES

-Literature describes-

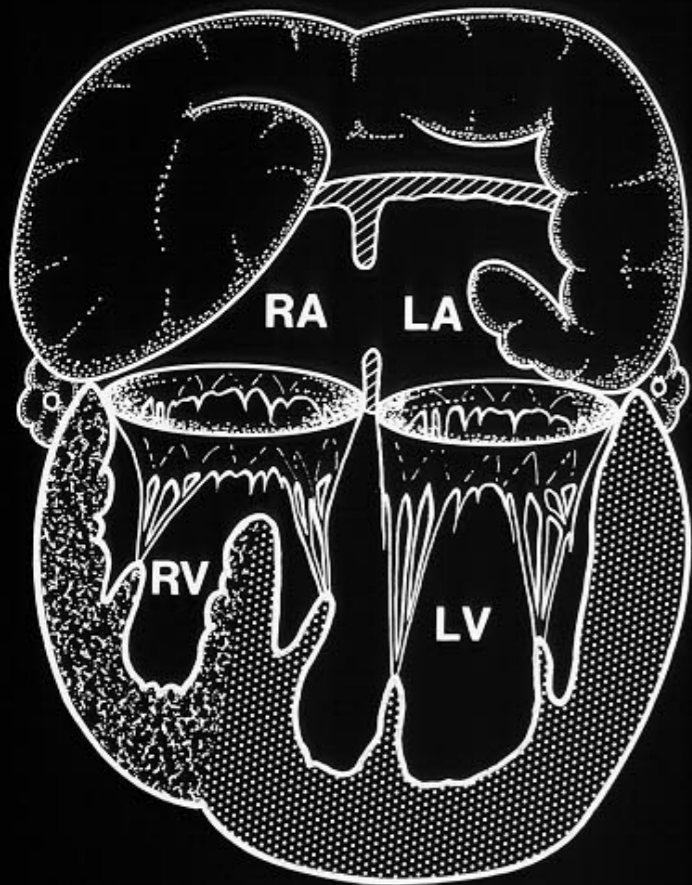
- TV and MV straddles through a malalignment VSD.
- TV straddles through the posteroinferior part of the septum or inlet VSD.
- MV straddles through the anterosuperior part of the septum or anterior VSD.



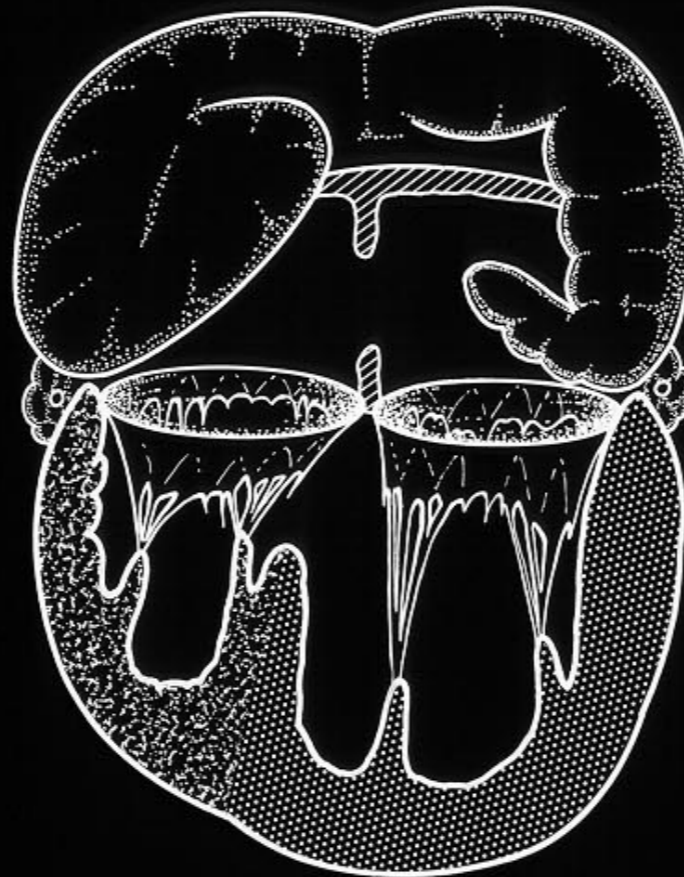
Overriding: Valve annulus  
Straddling: Papillary muscles/Chords



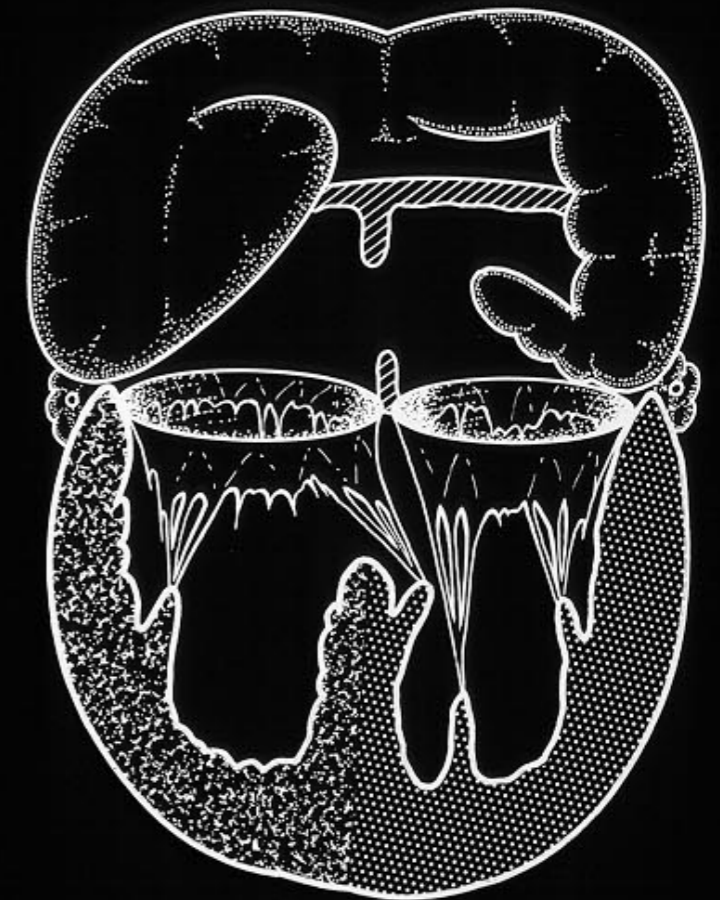
Overriding: Valve annulus  
Straddling: Papillary muscles/Chords



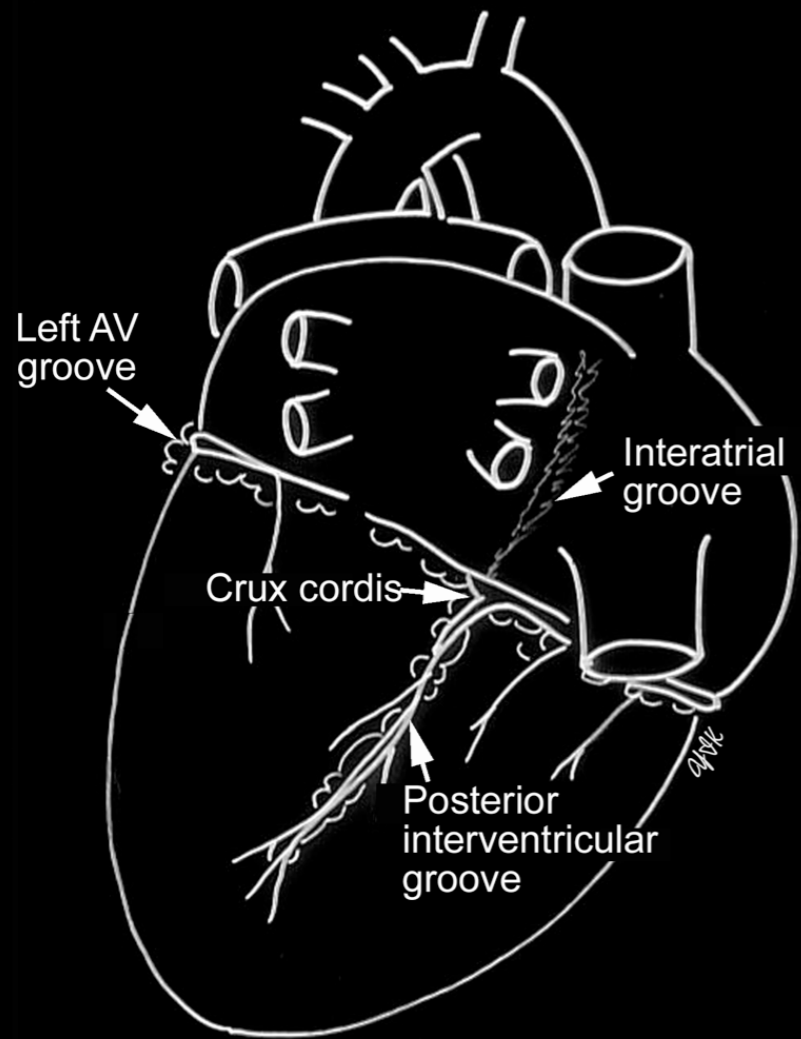
Straddling and  
Overriding



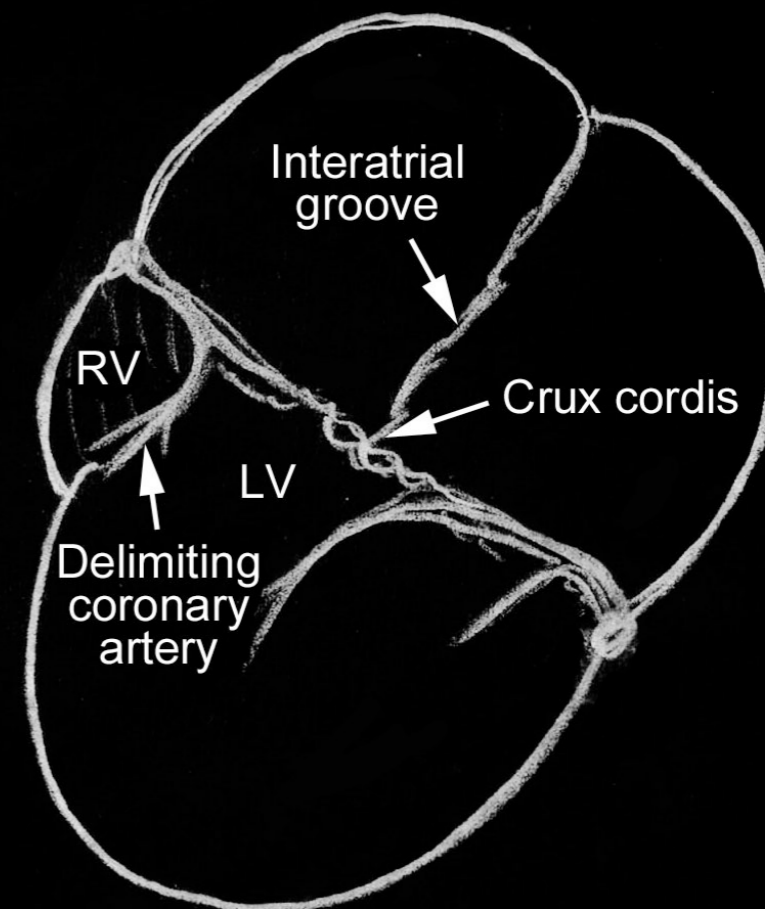
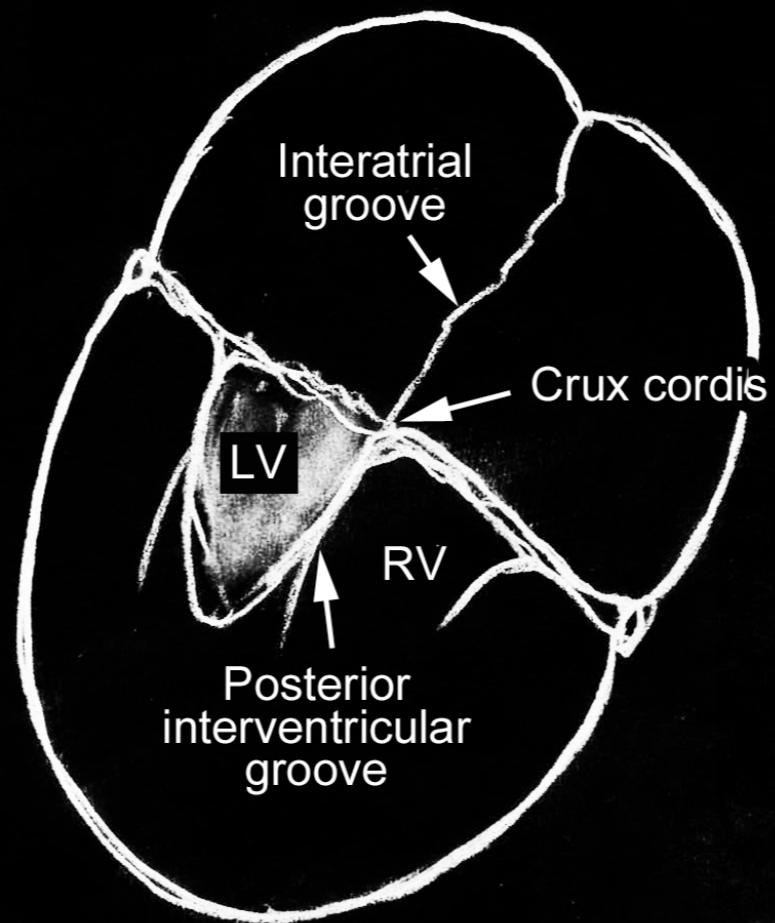
Overriding without  
Straddling

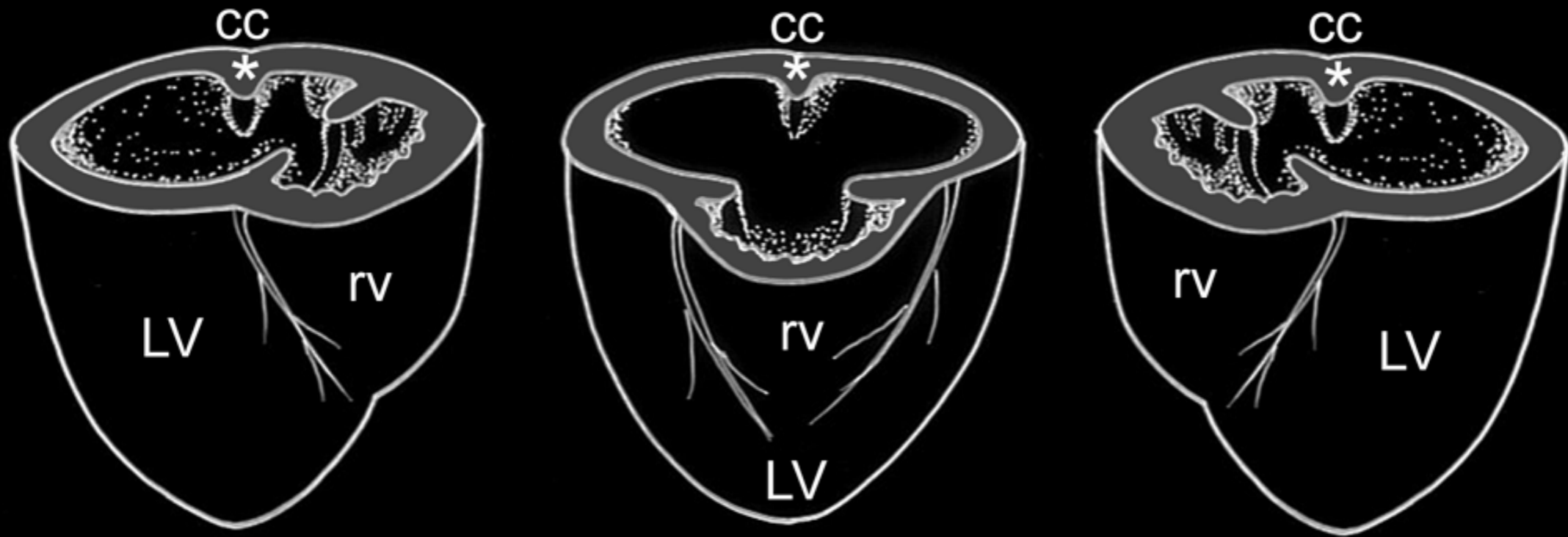


Straddling without  
Overriding

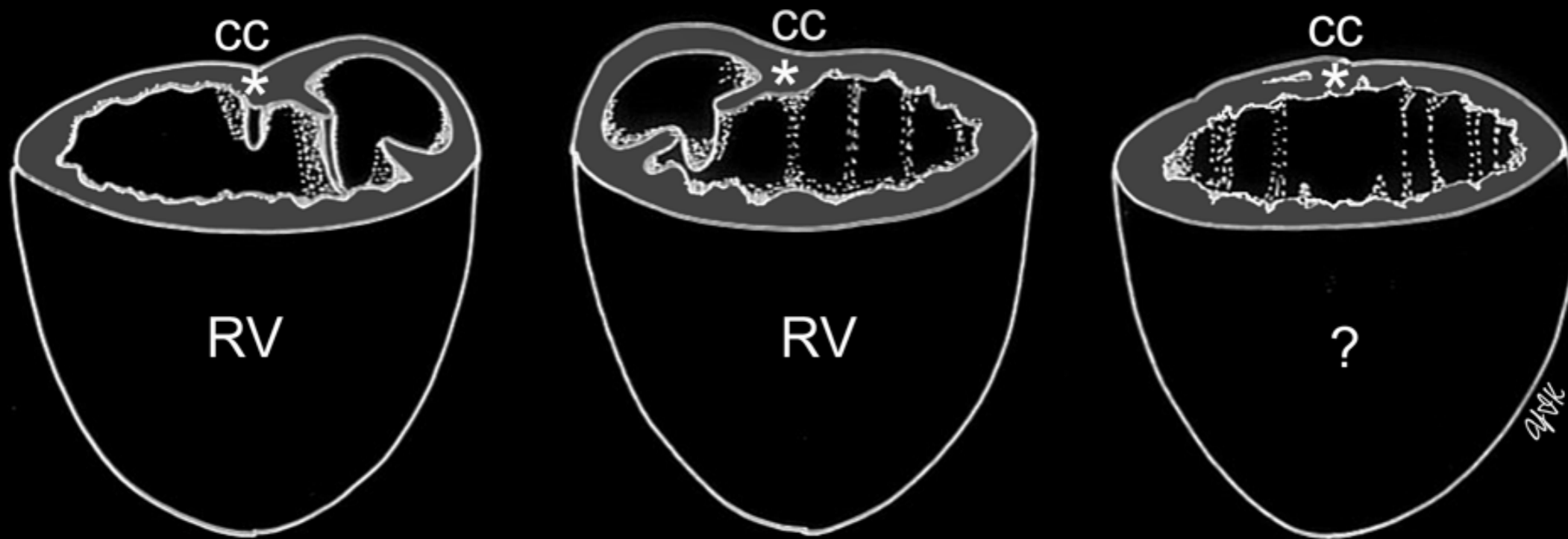


## Crux cordis





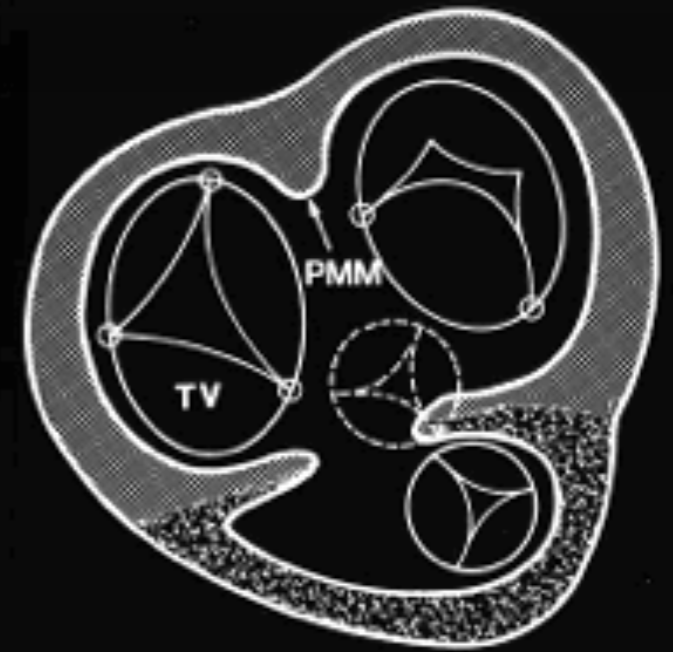
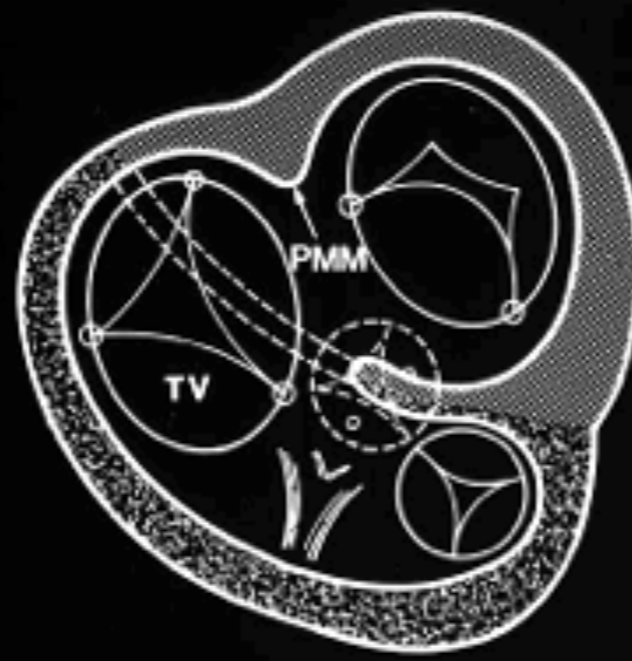
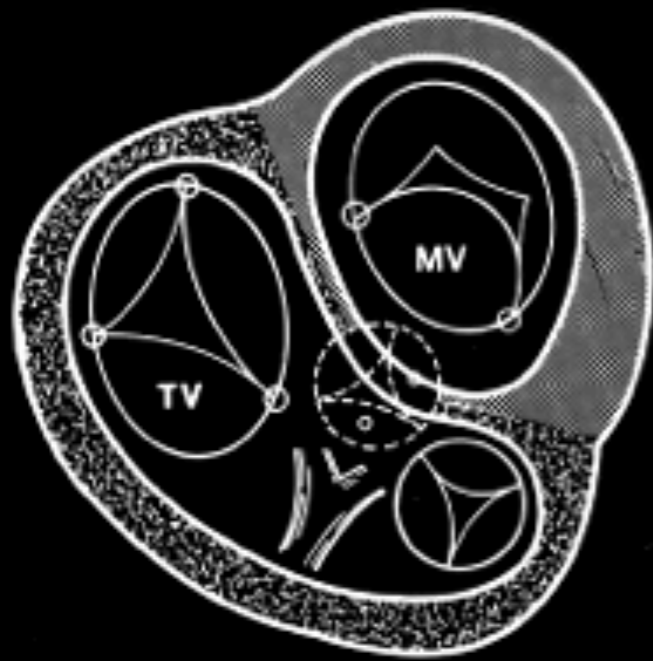
Main chamber with left ventricular morphology  
 Single LV



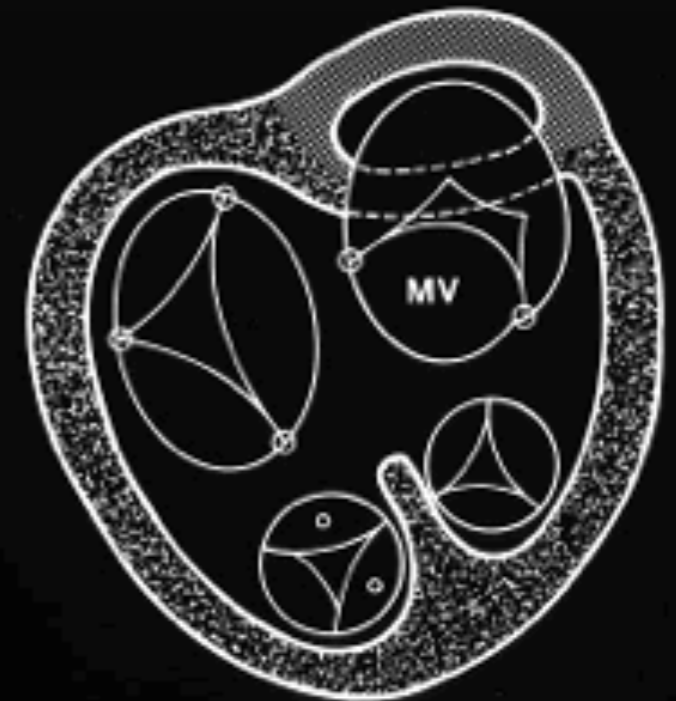
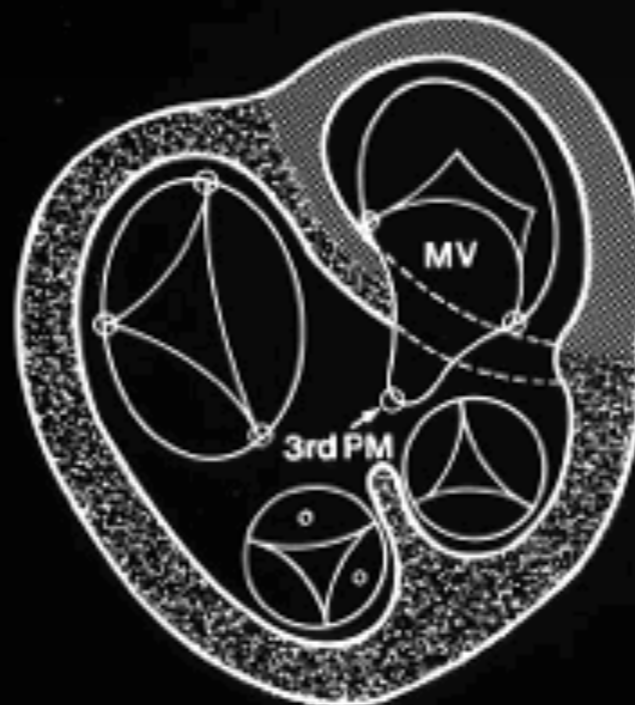
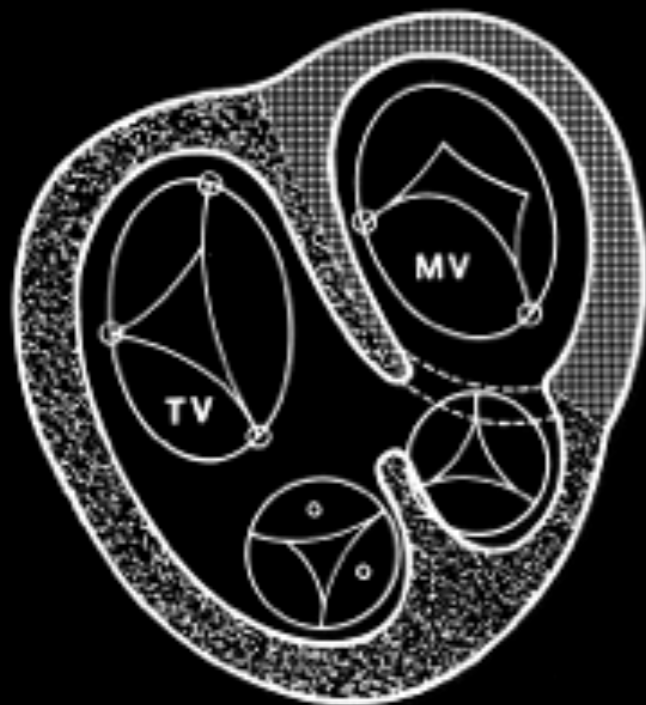
Main chamber with  
 right ventricular morphology  
 Single RV

Solitary ventricle of  
 indeterminate morphology





STRADDLING TV AND DOUBLE INLET LV



STRADDLING MV AND DOUBLE INLET RV

# SEPTAL MALALIGNMENT

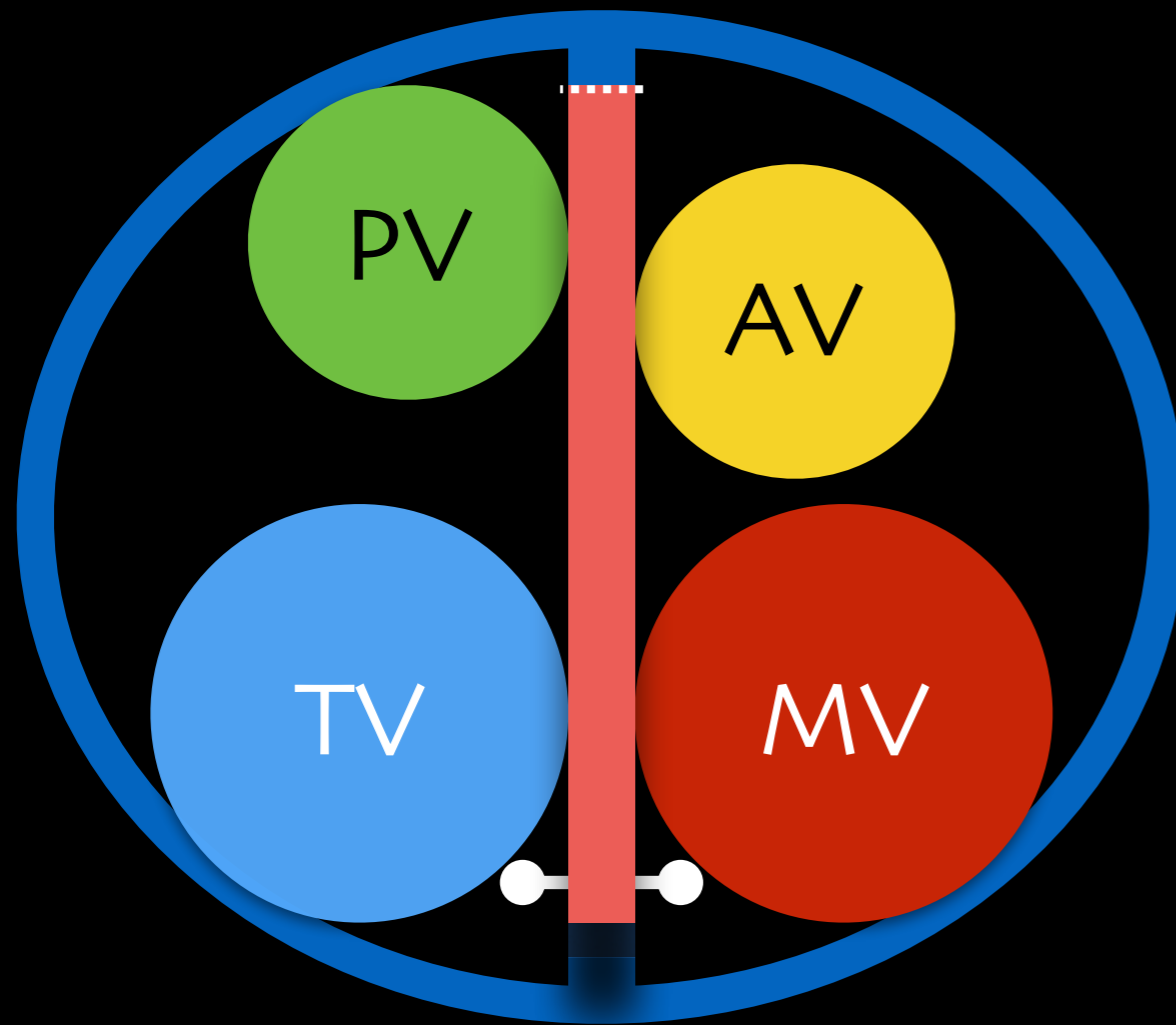
-Essential features to define-

- Malaligned part of the septum
- Mechanisms of malalignment
- Reference structure: In relation to what?
- Direction of malalignment
- Extent of malalignment

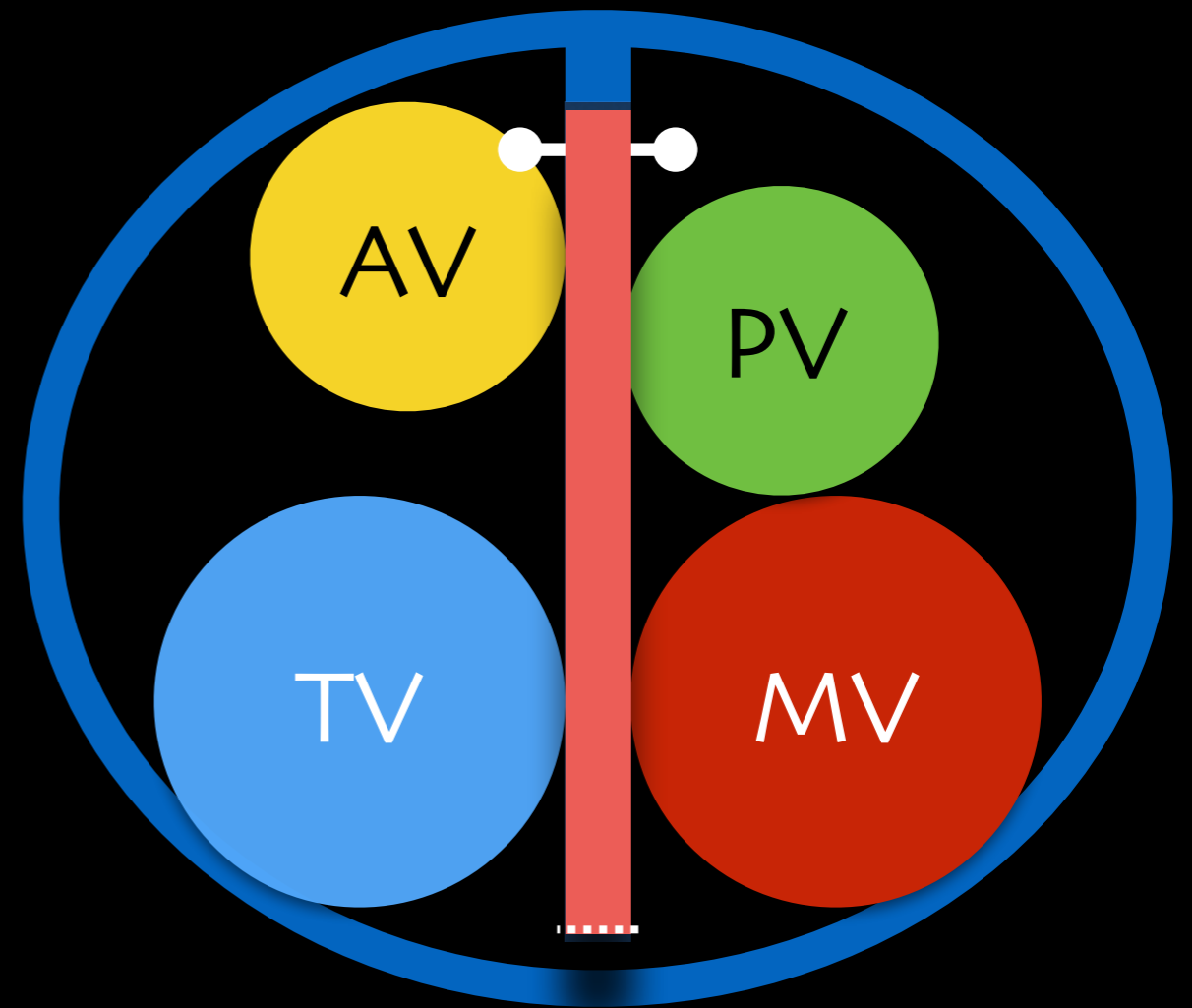


# MECHANISMS OF MALALIGNMENT

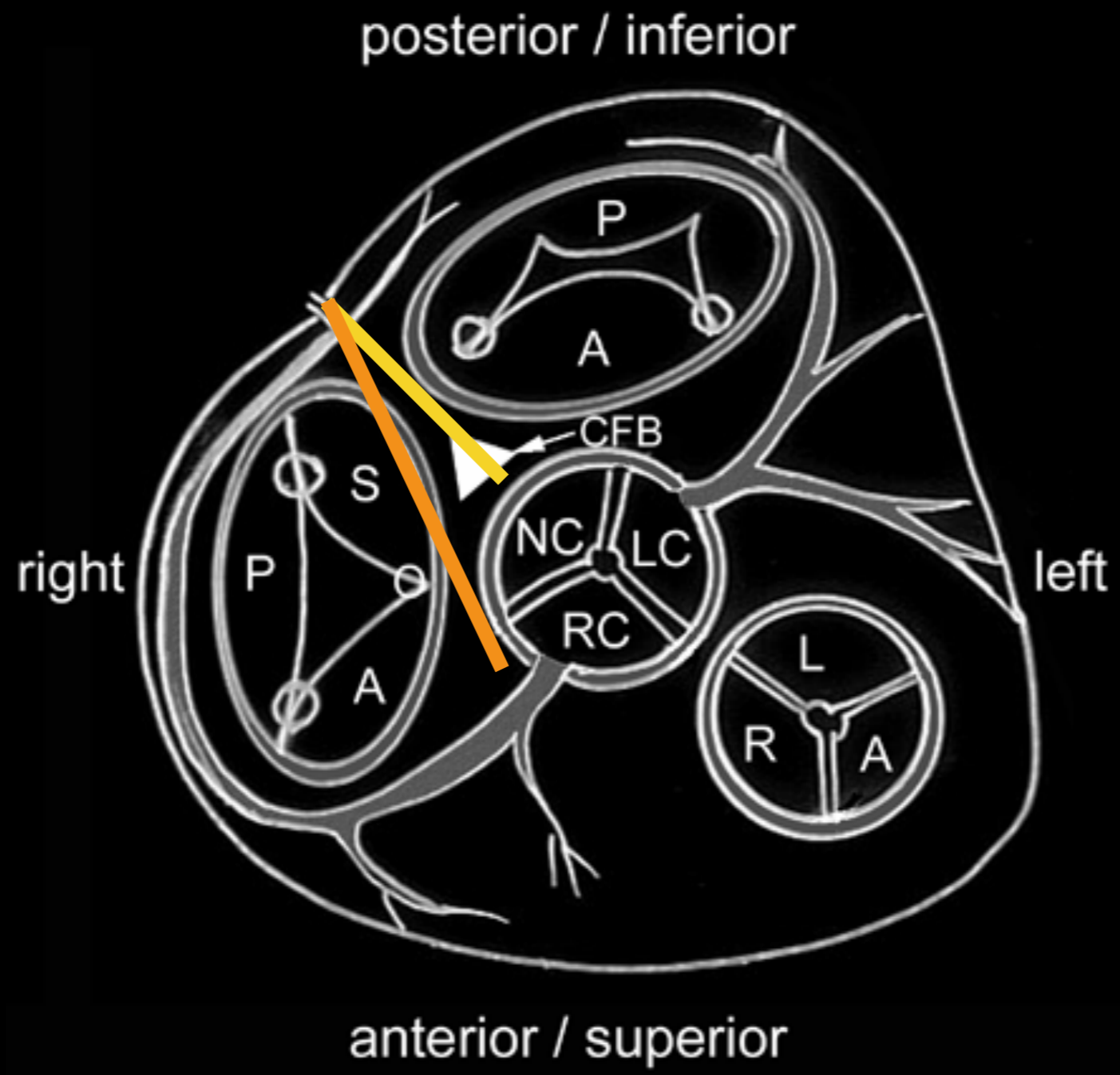
Straddling / Overriding an AV Valve  
Flap door mechanism



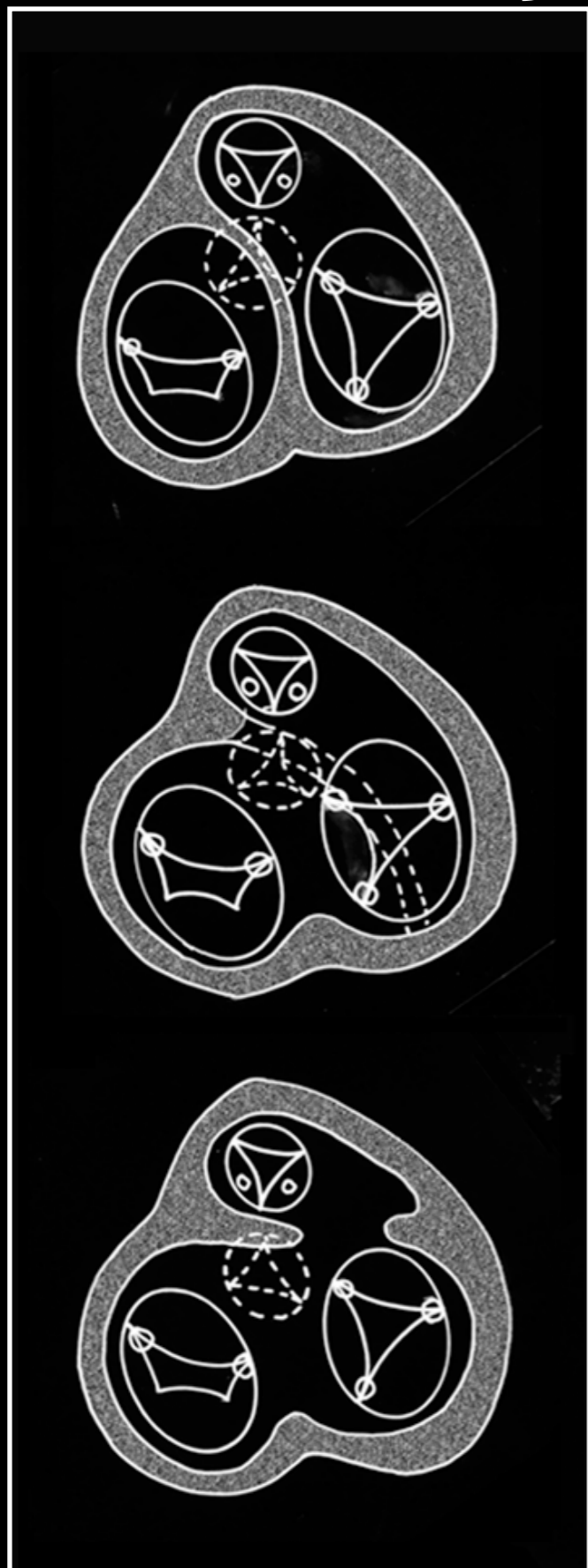
Pulmonary stenosis



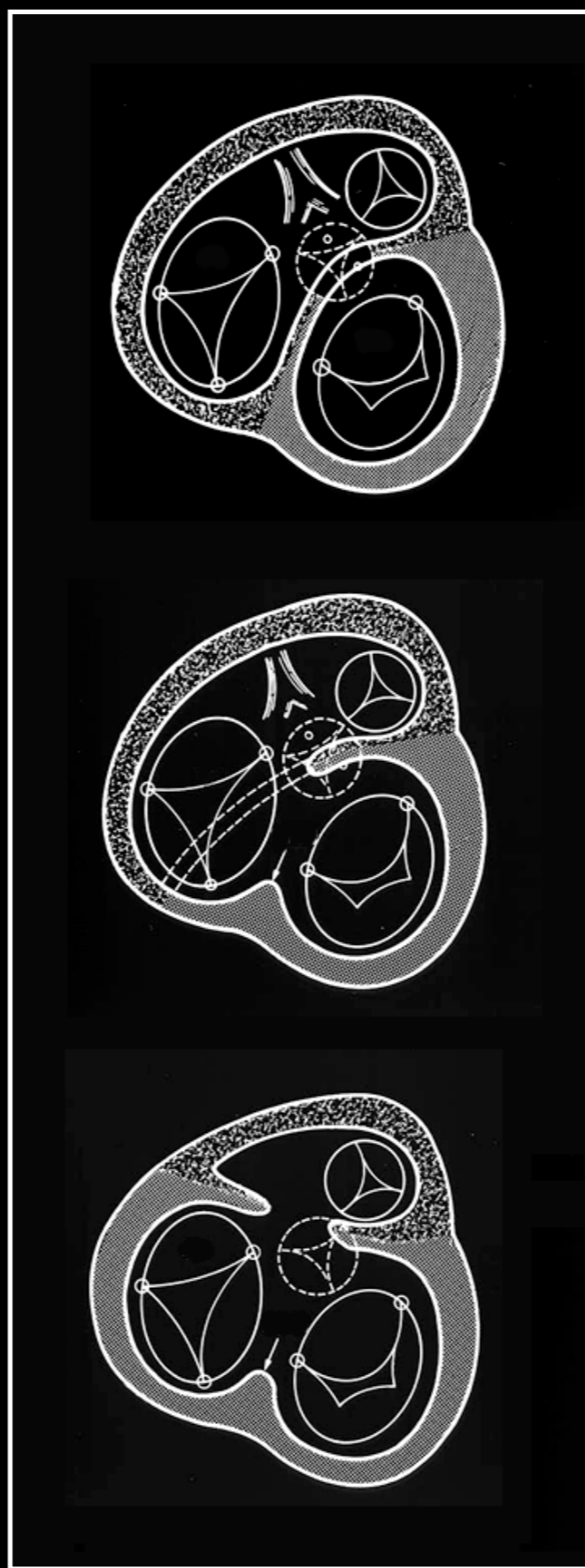
DORV



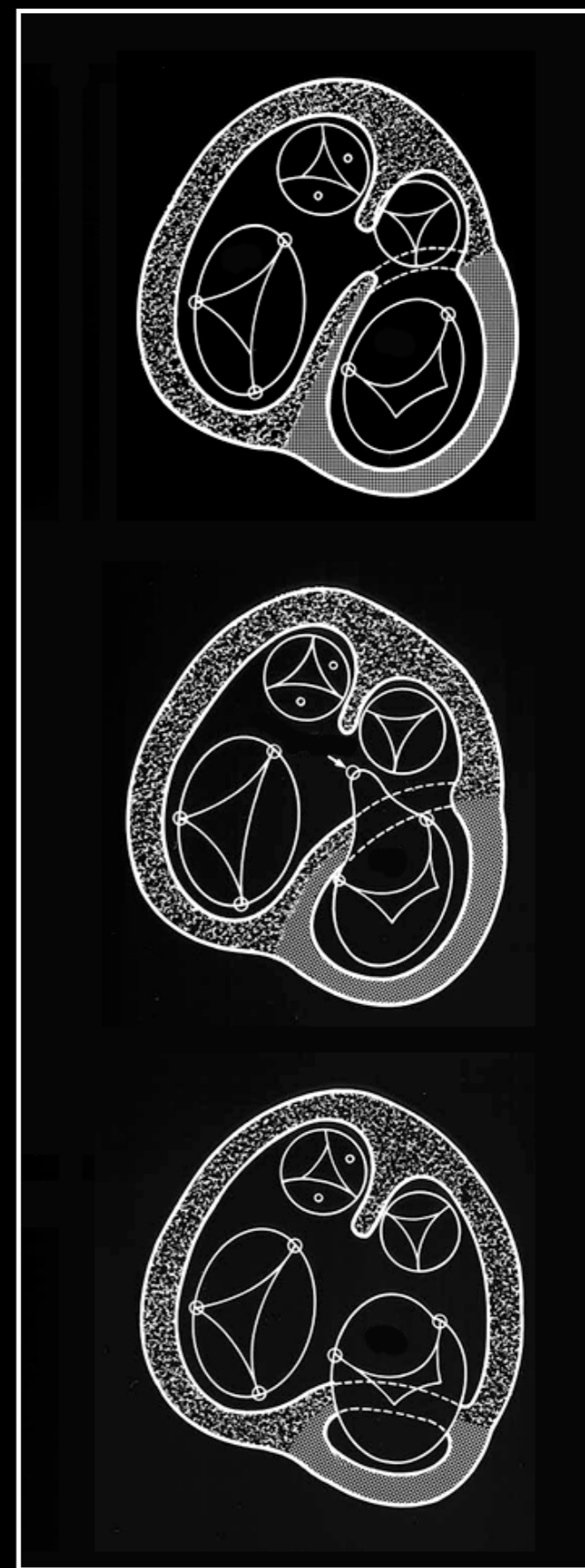
L-loop  
TV straddling

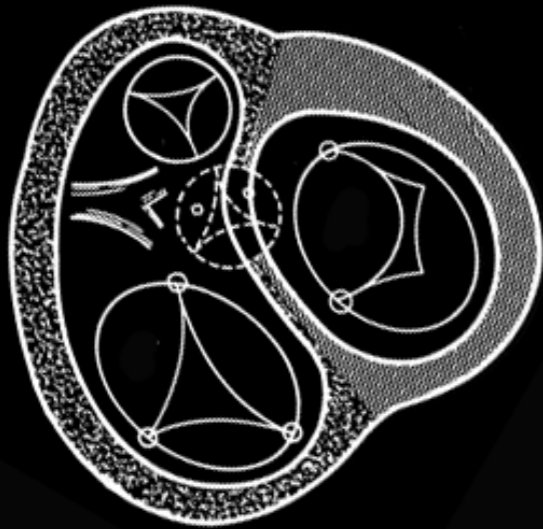


D-loop  
TV straddling

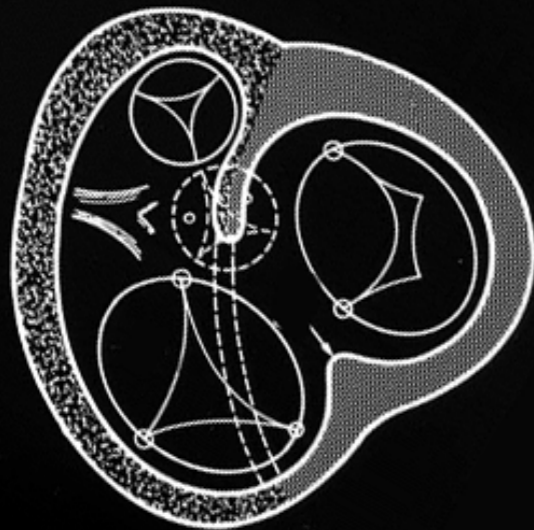


D-loop  
MV straddling

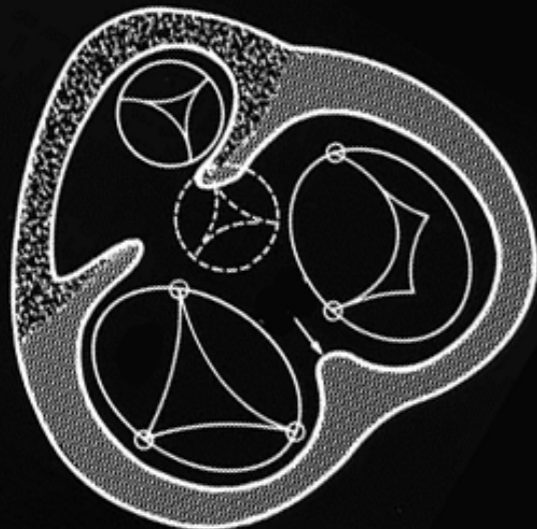




Normal Heart



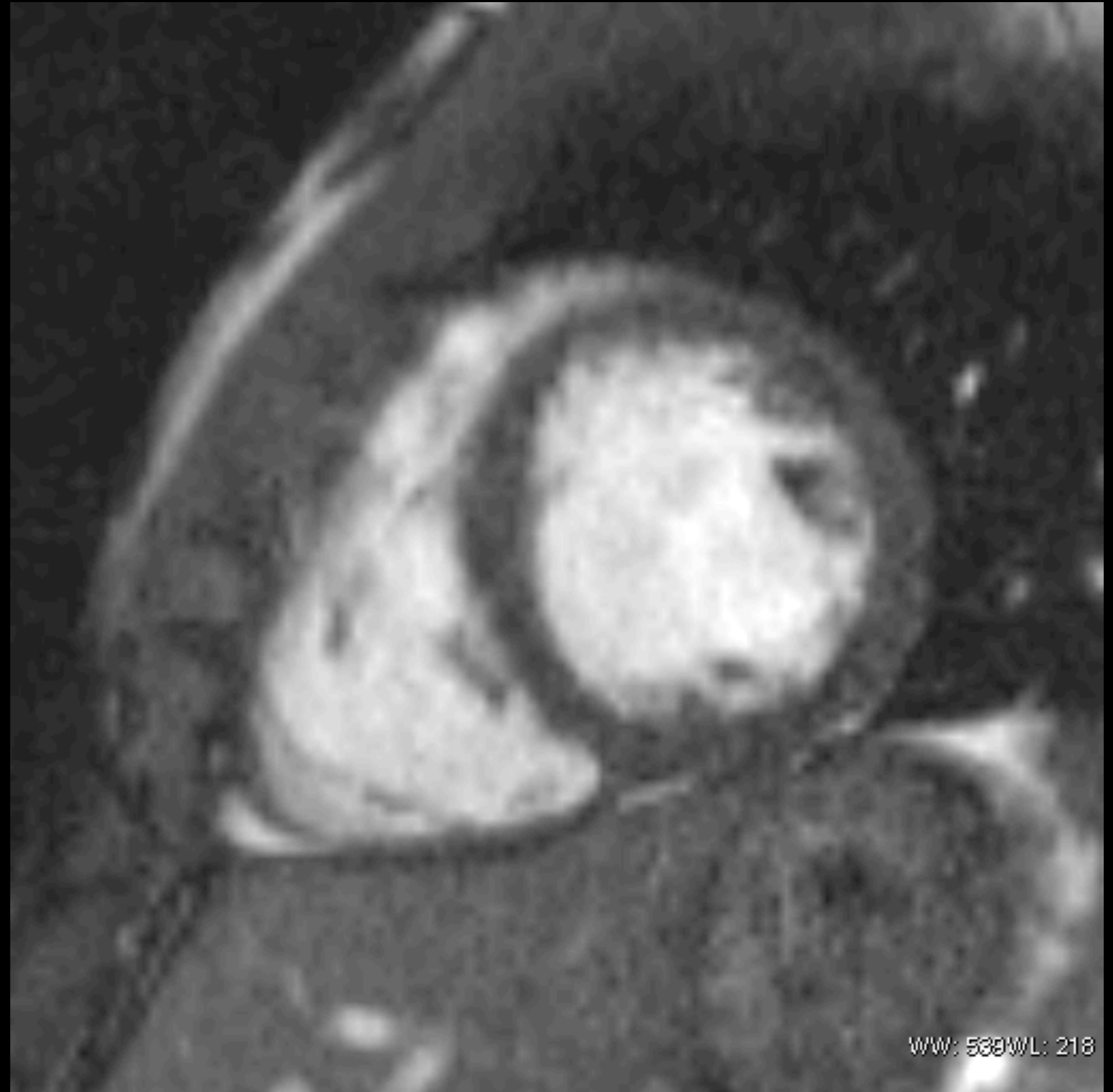
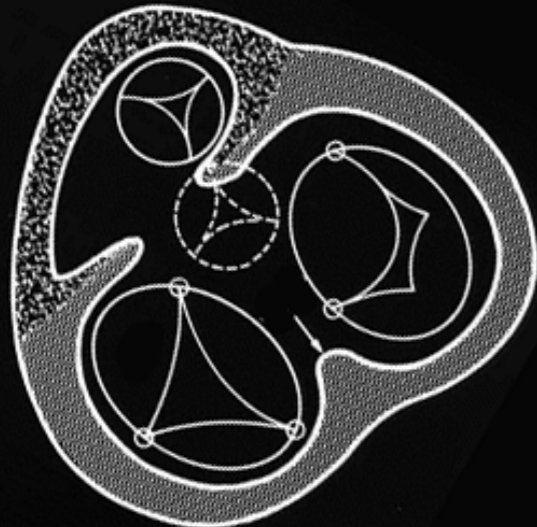
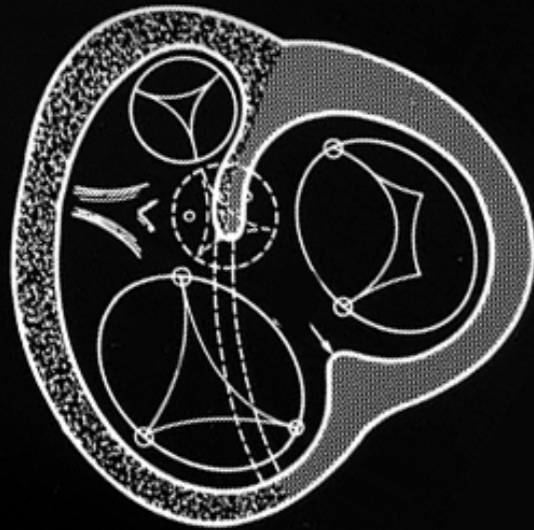
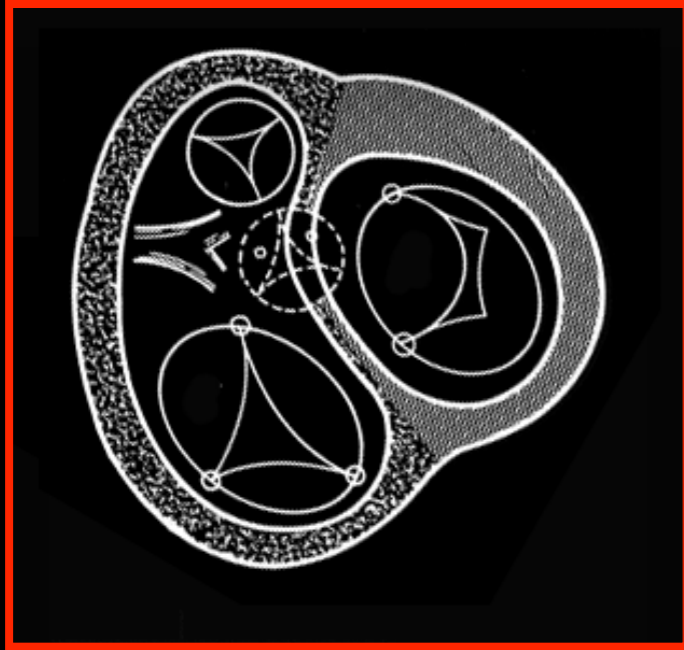
Straddling Tricuspid Valve



Double Inlet Left Ventricle

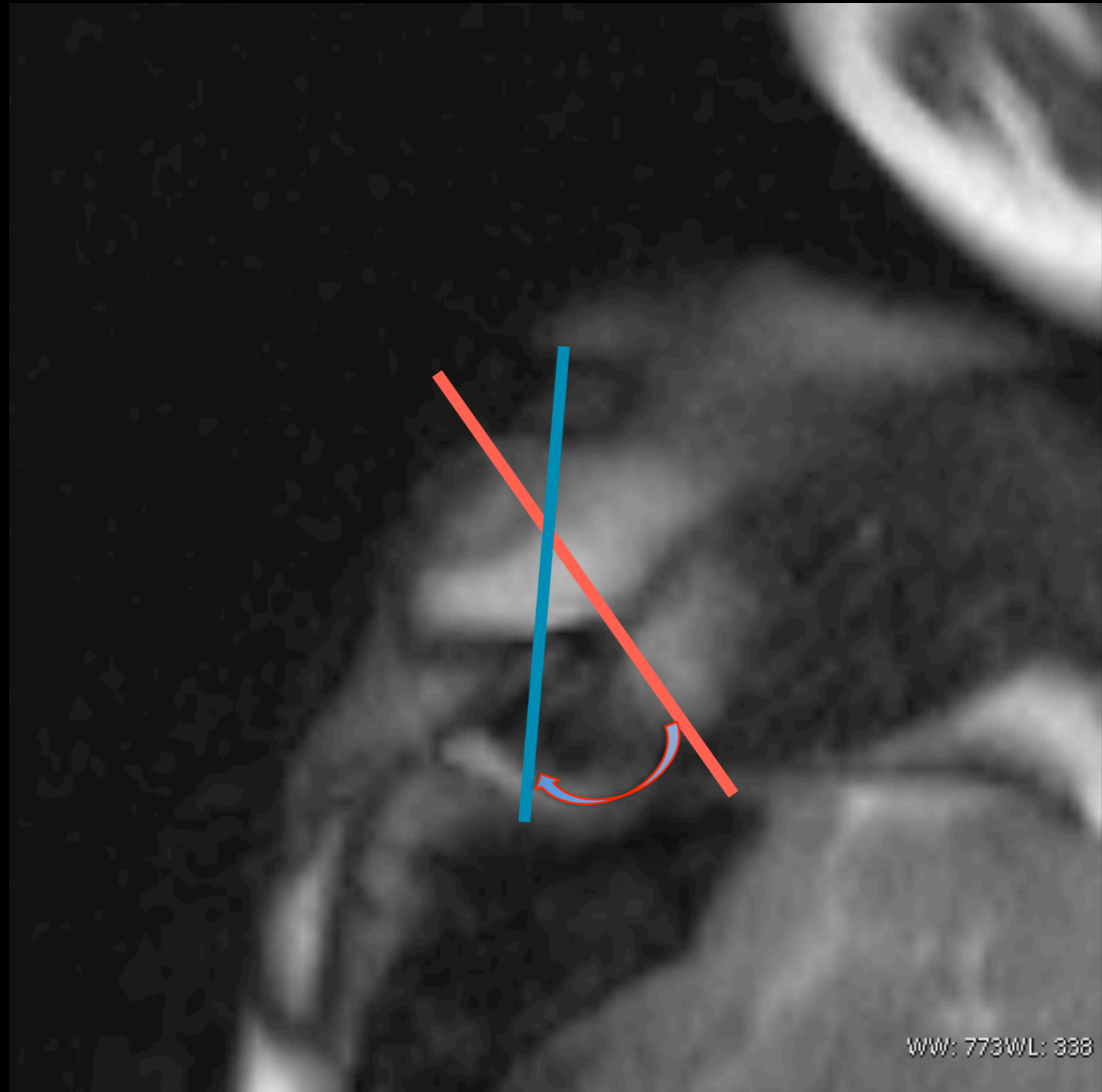
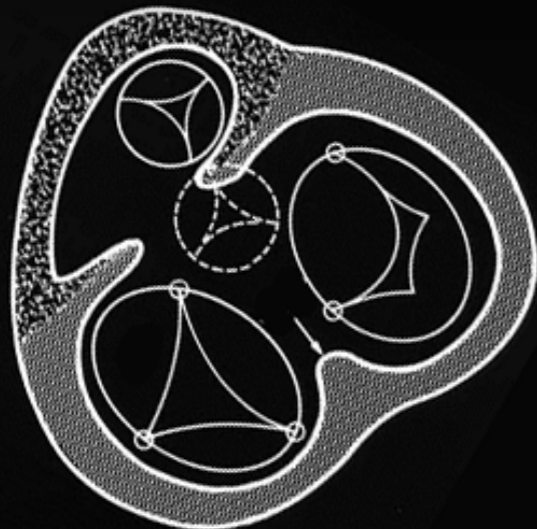
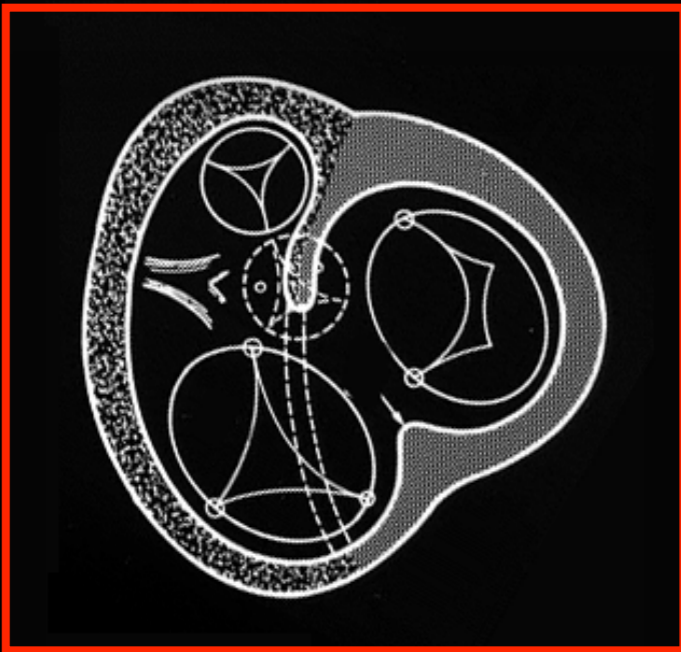
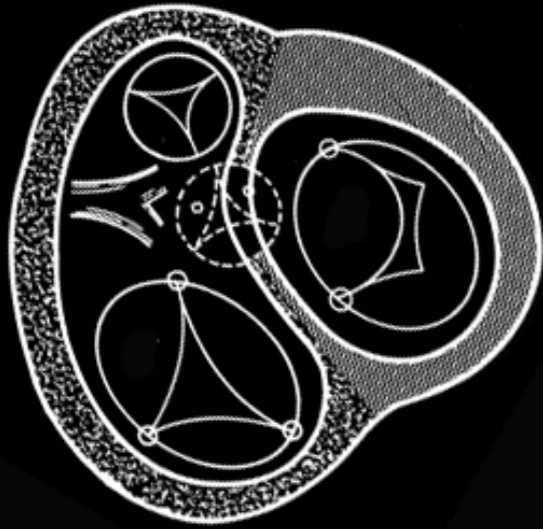


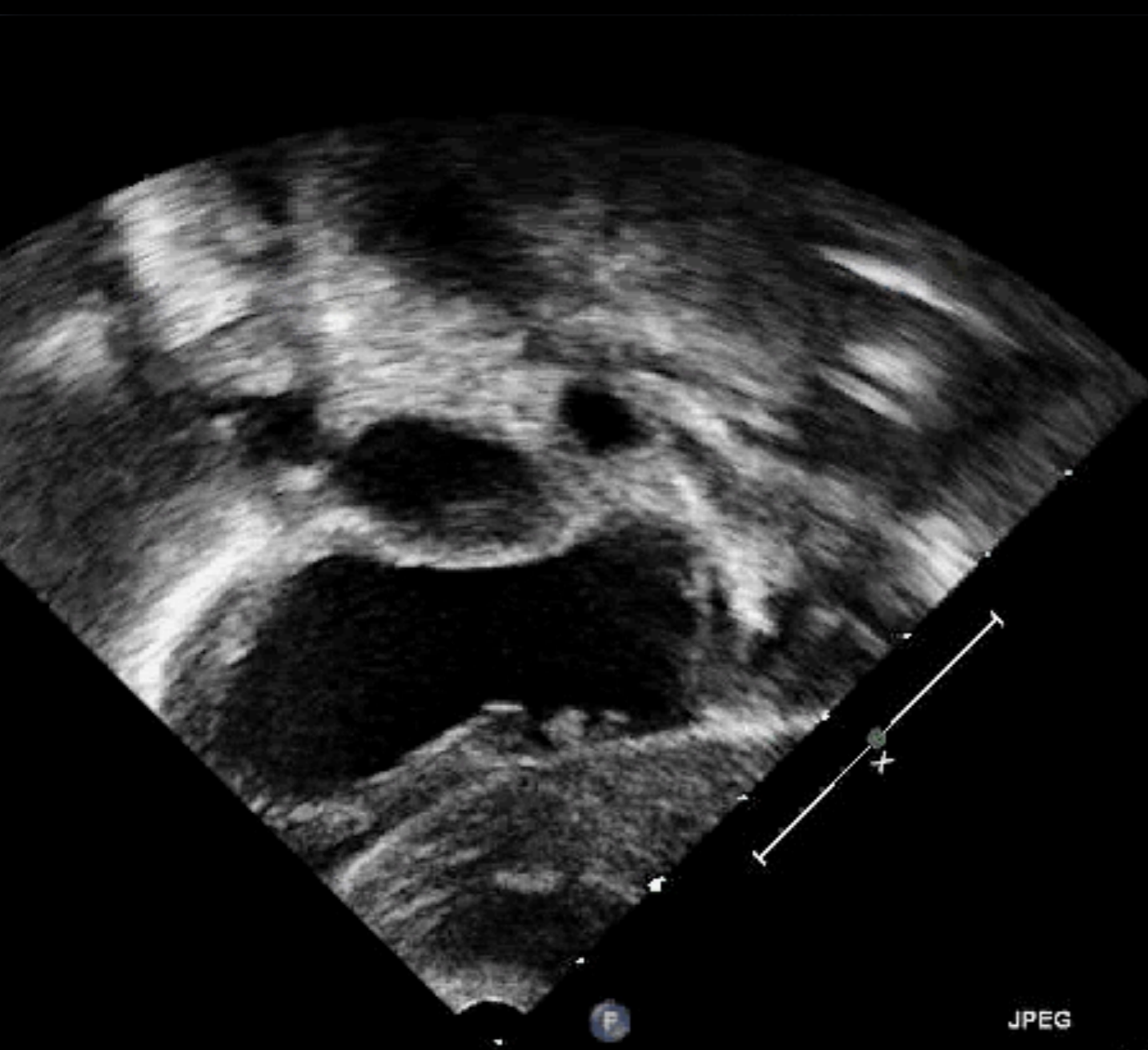
# Normal Heart



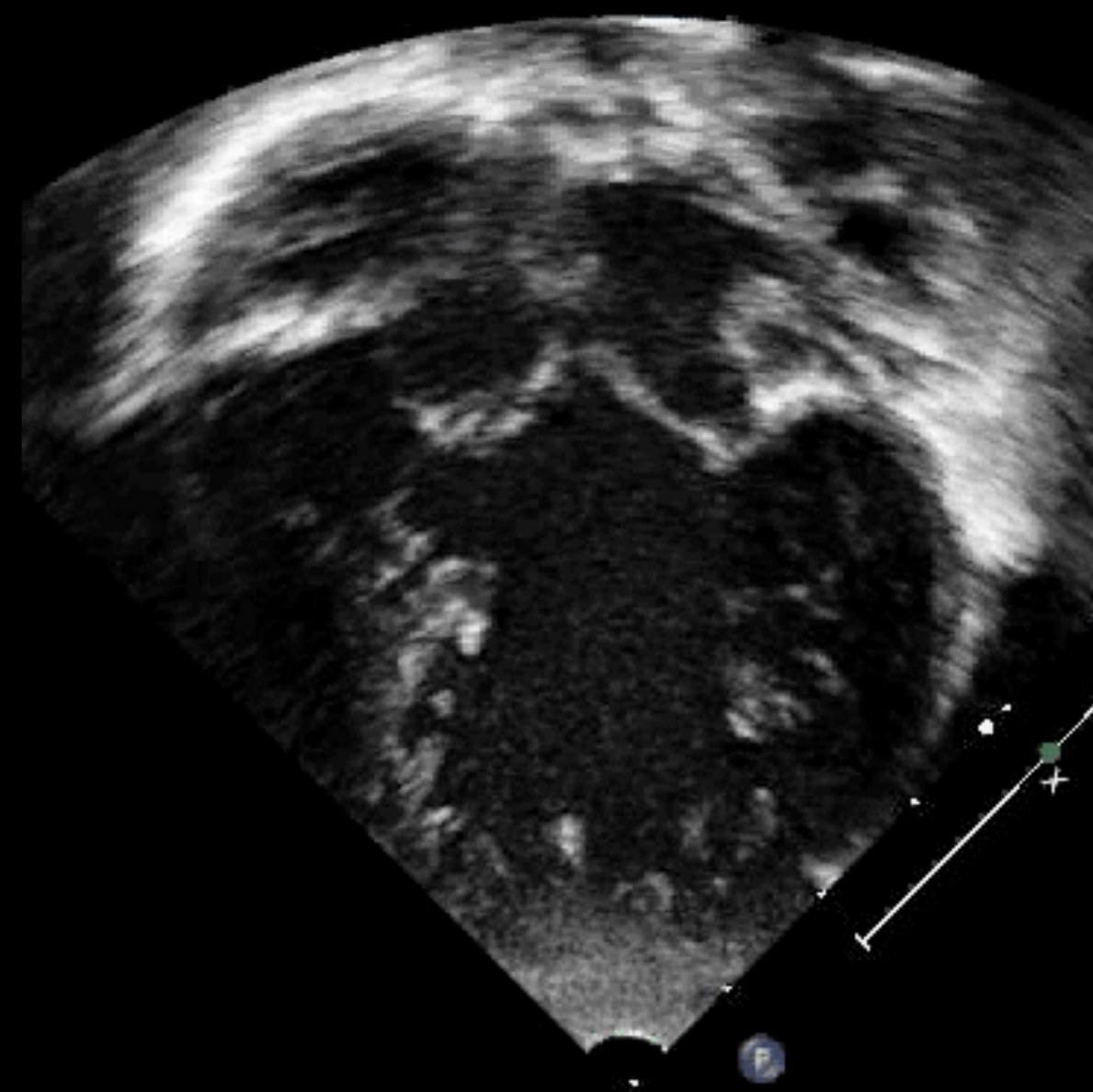


Situs solitus  
Normal ventricular relationship  
Straddling tricuspid valve





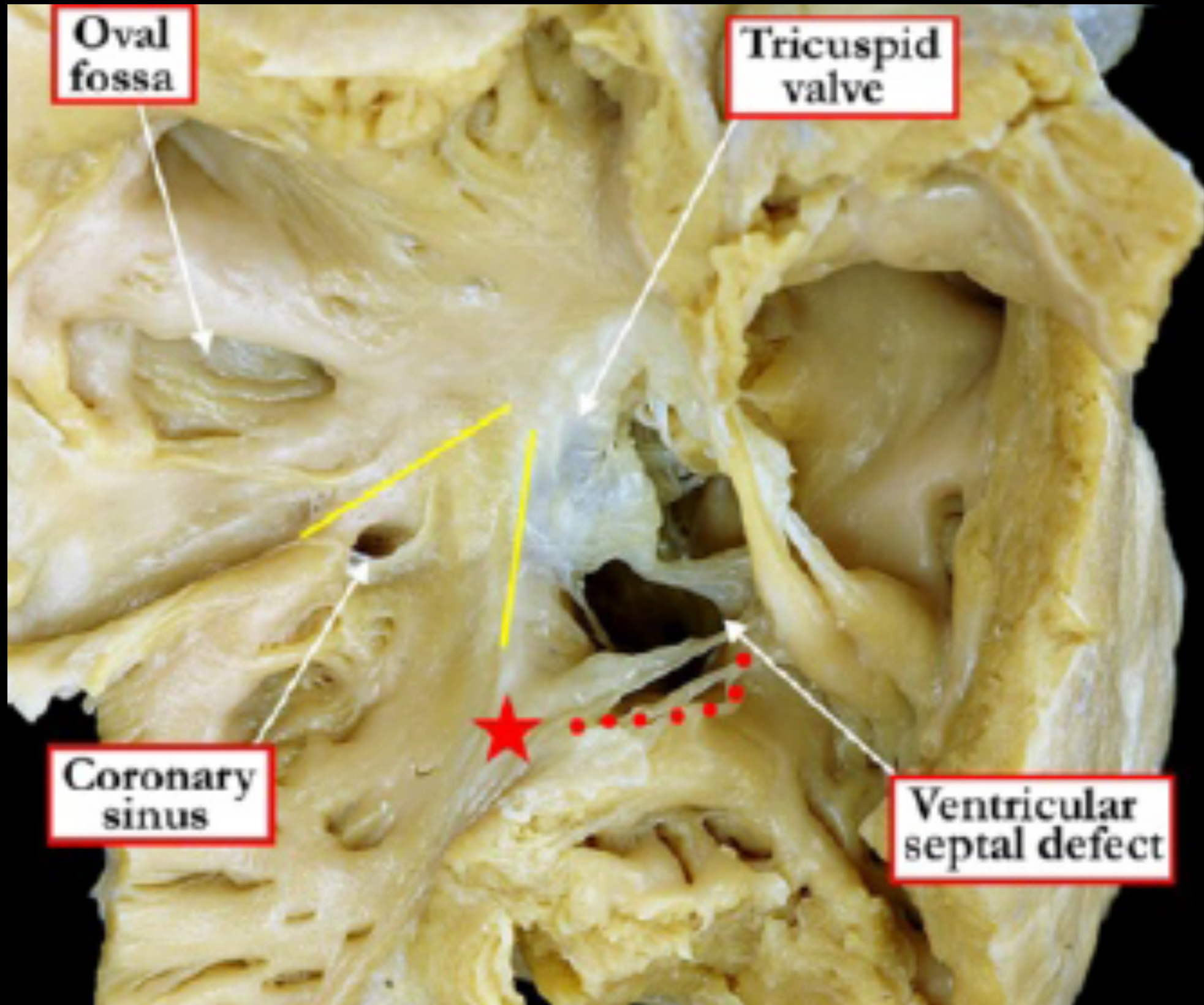
M3



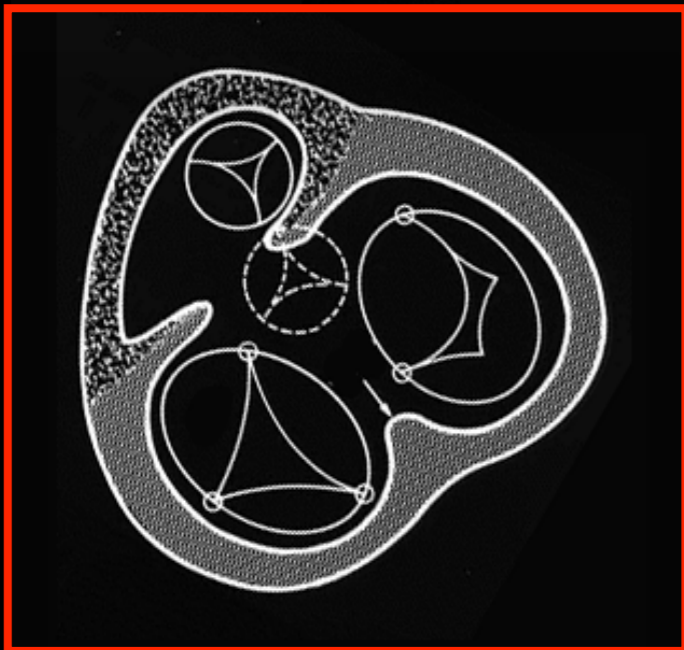
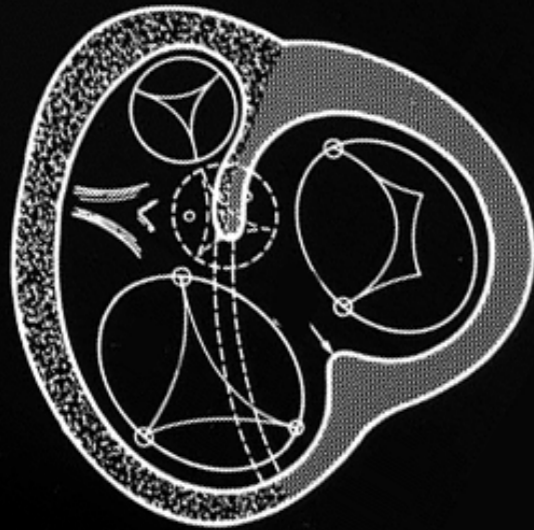
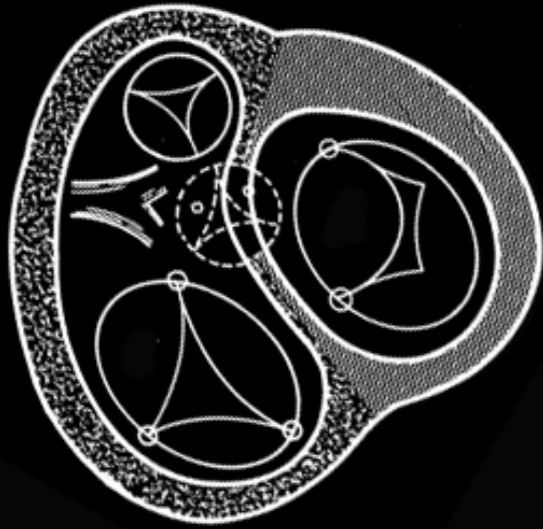
JPEG

120 bpm



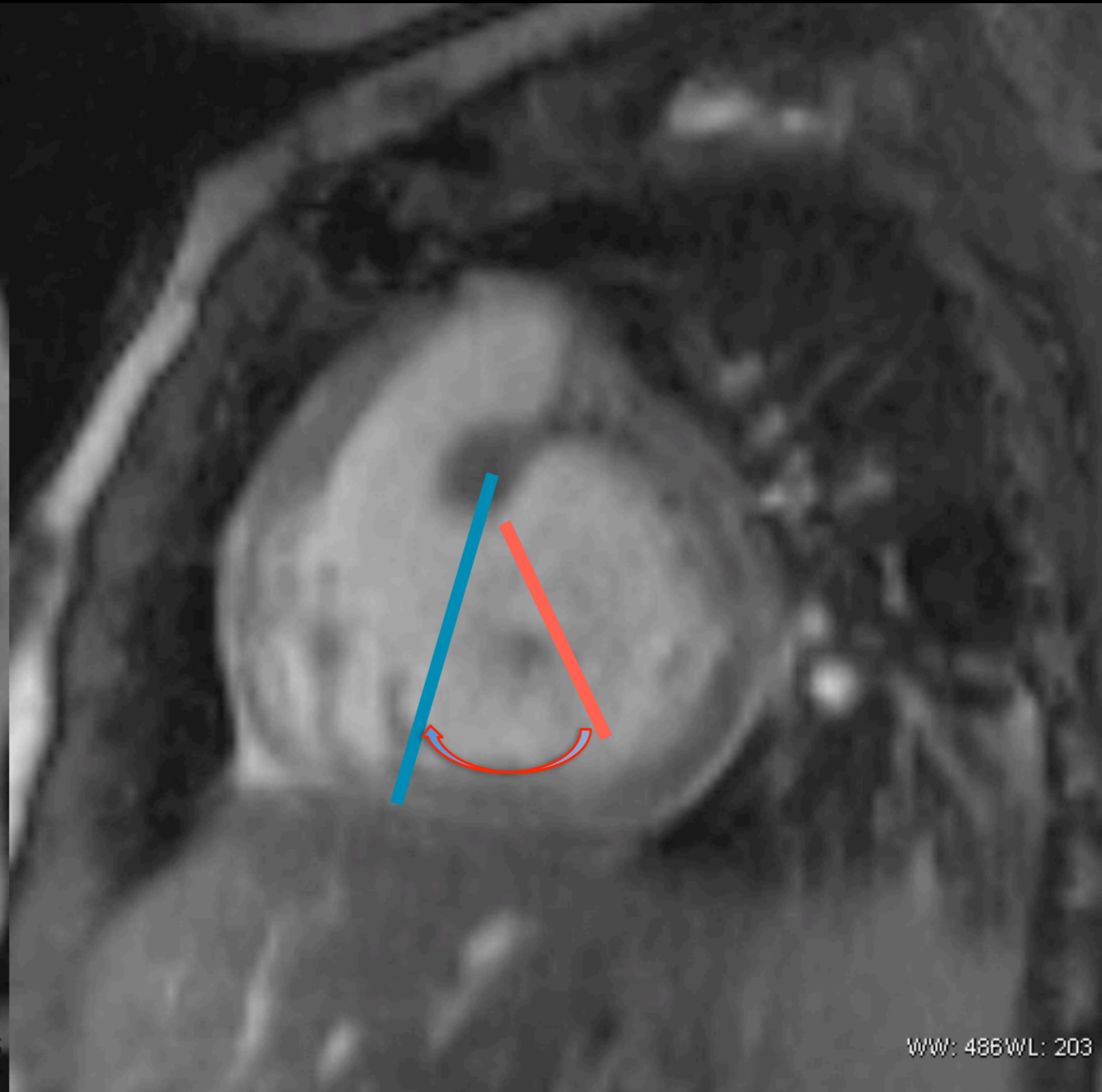


Situs solitus  
Normal ventricular relationship  
Double inlet left ventricle





# Situs solitus / Normal ventricular relationship Unbalanced AVSD - Double inlet left ventricle







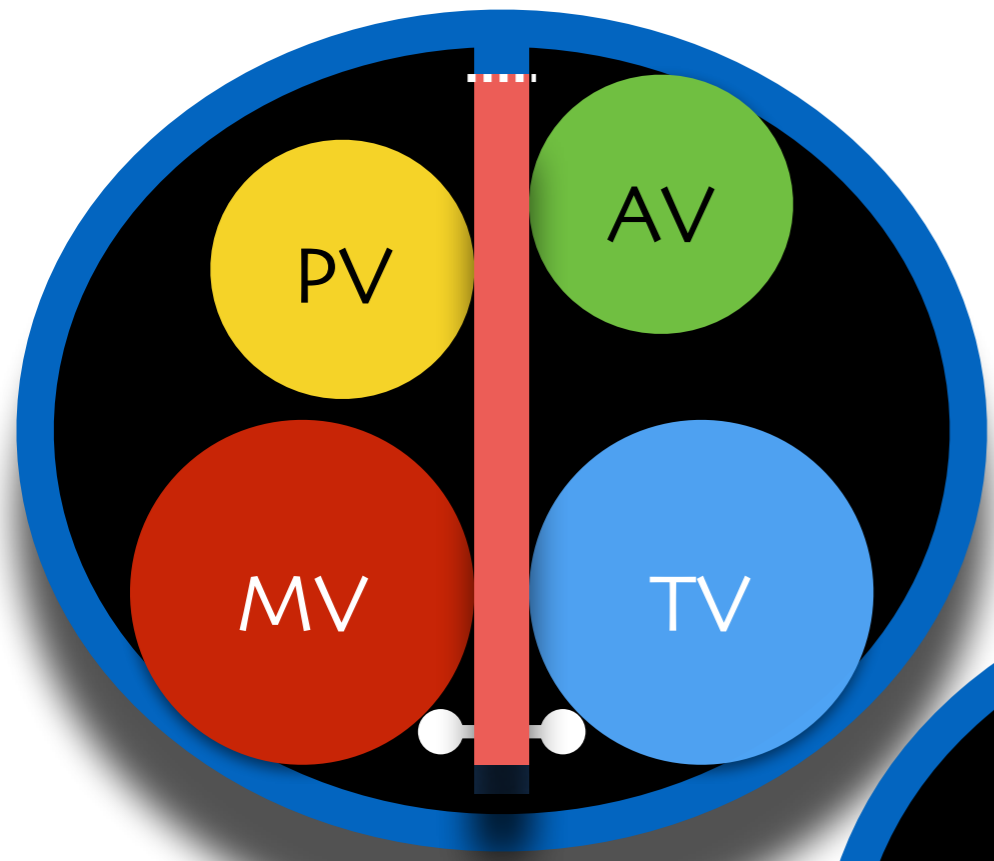
Congenitally Corrected Transposition



Straddling Tricuspid (left AV) Valve

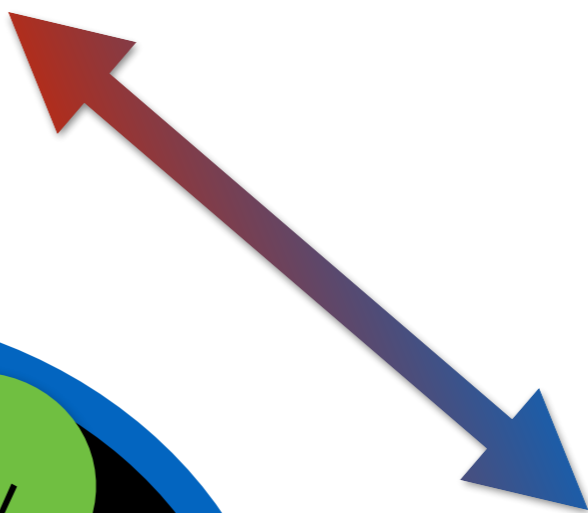
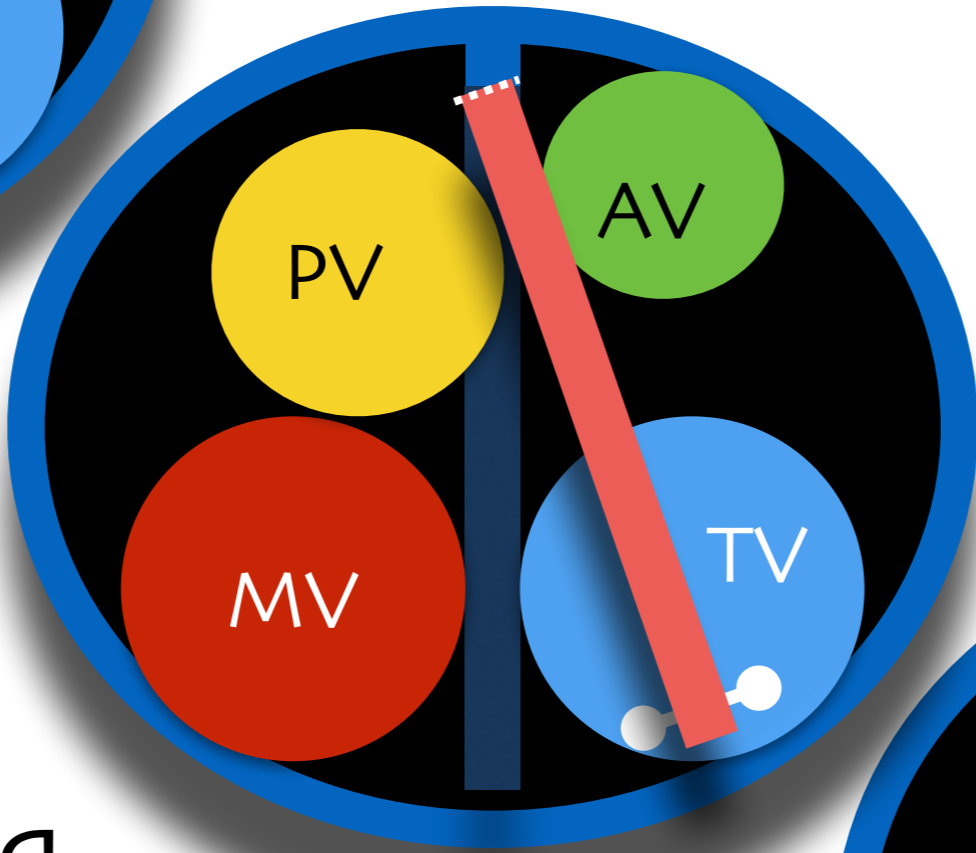


Double Inlet Left Ventricle

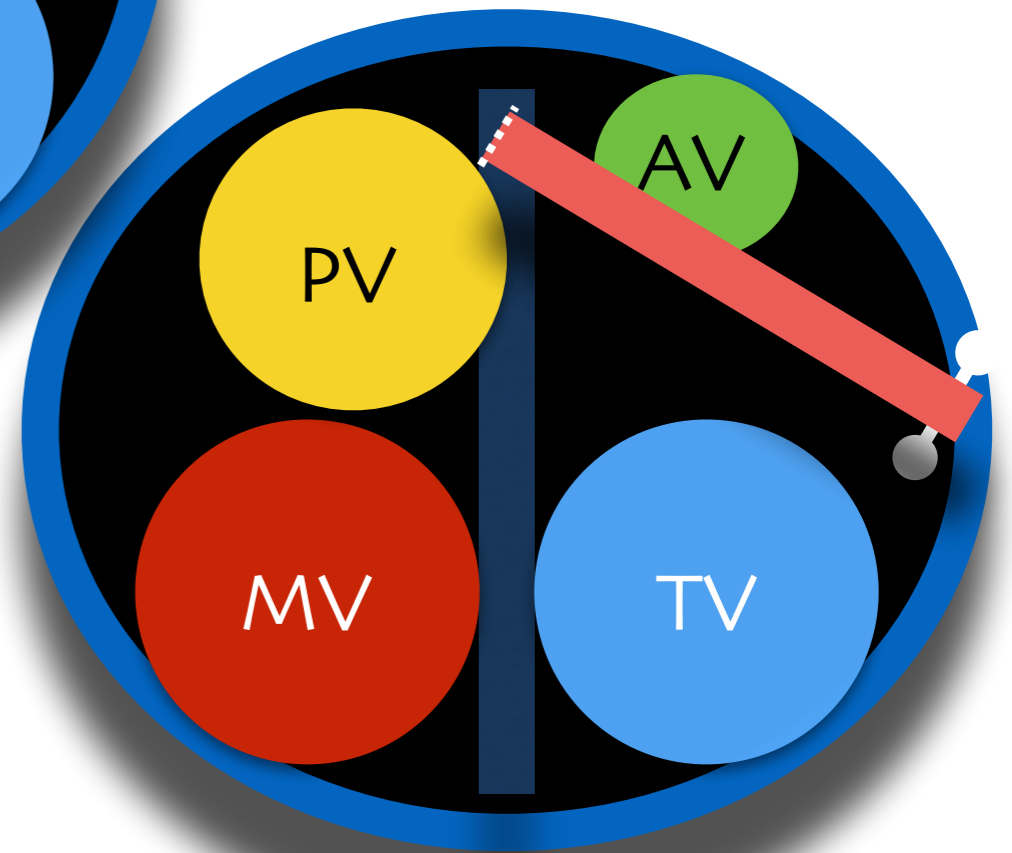


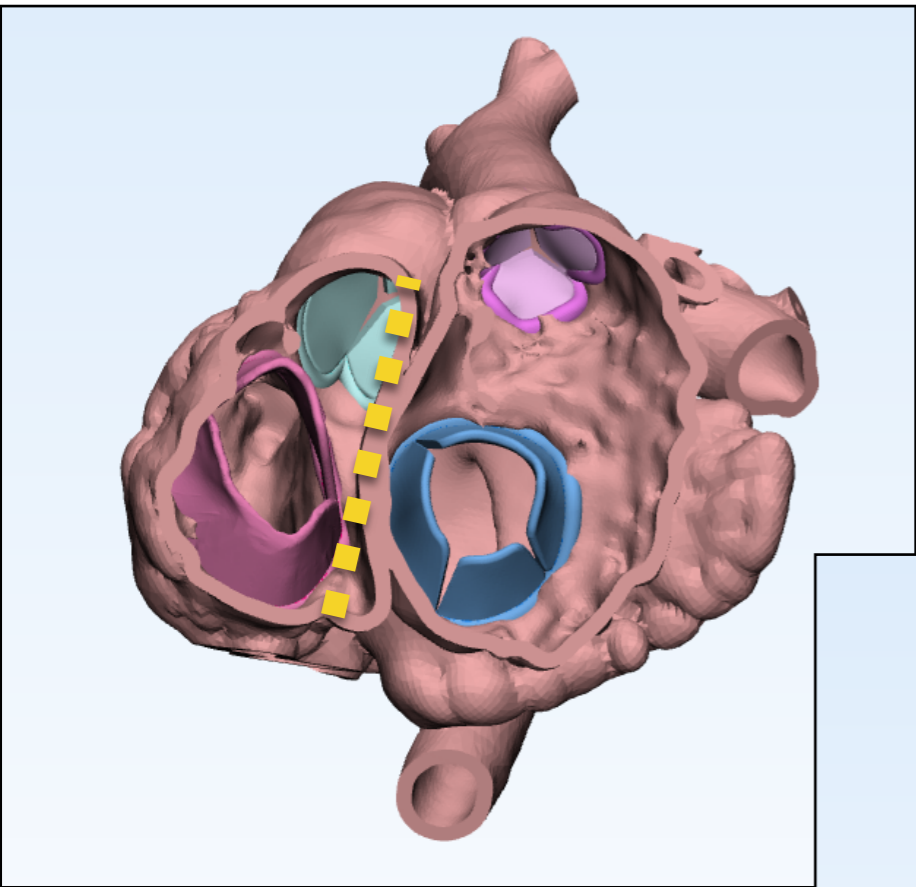
Straddling  
tricuspid  
valve

CCTGA

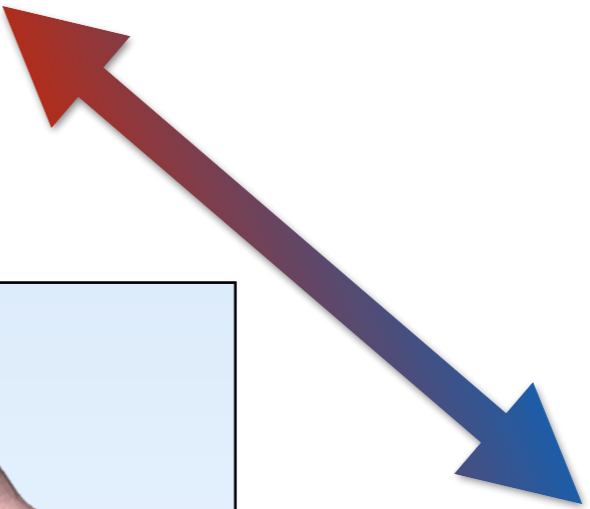


DILV

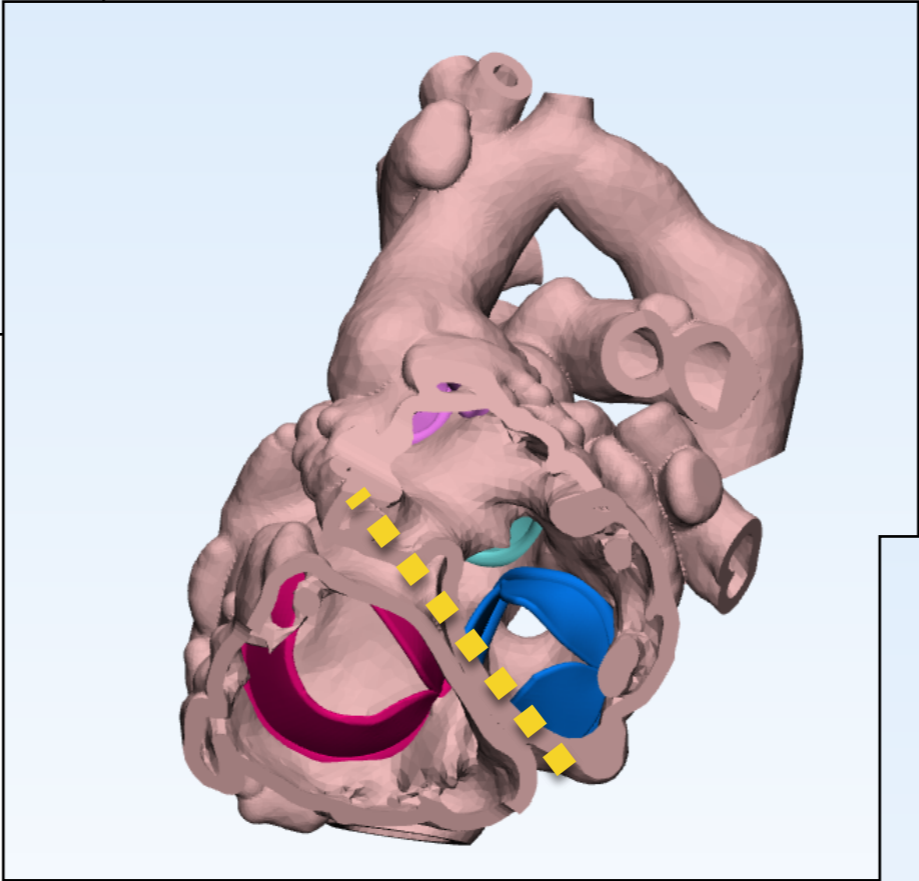




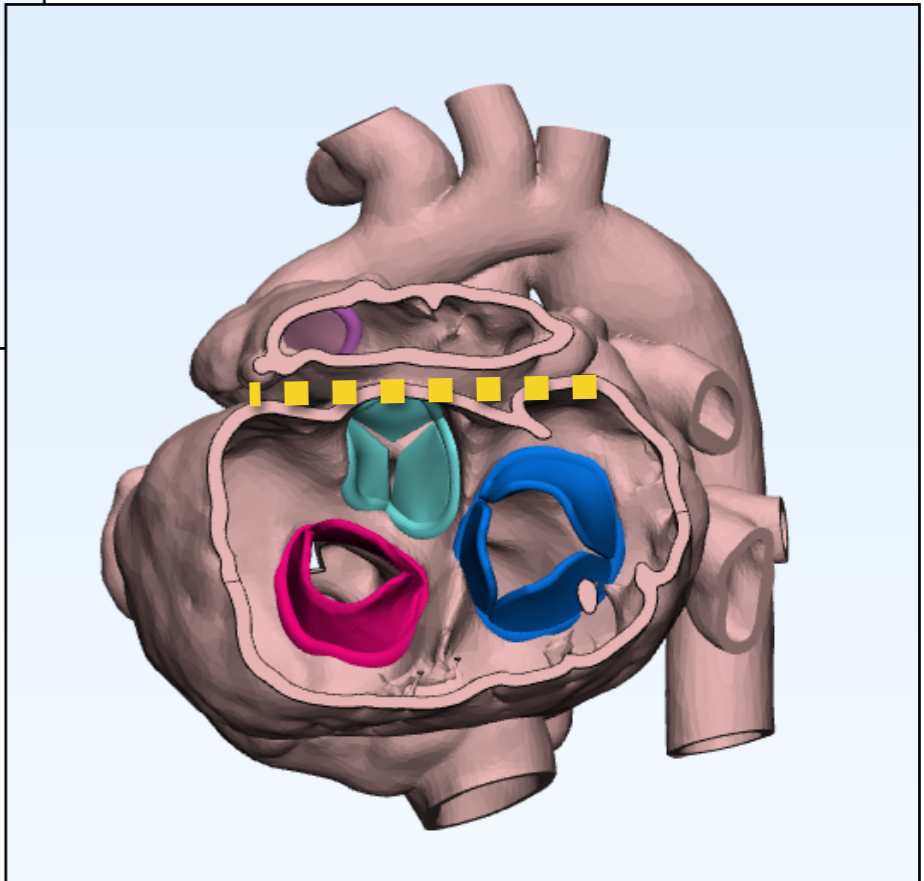
CCTGA



DILV

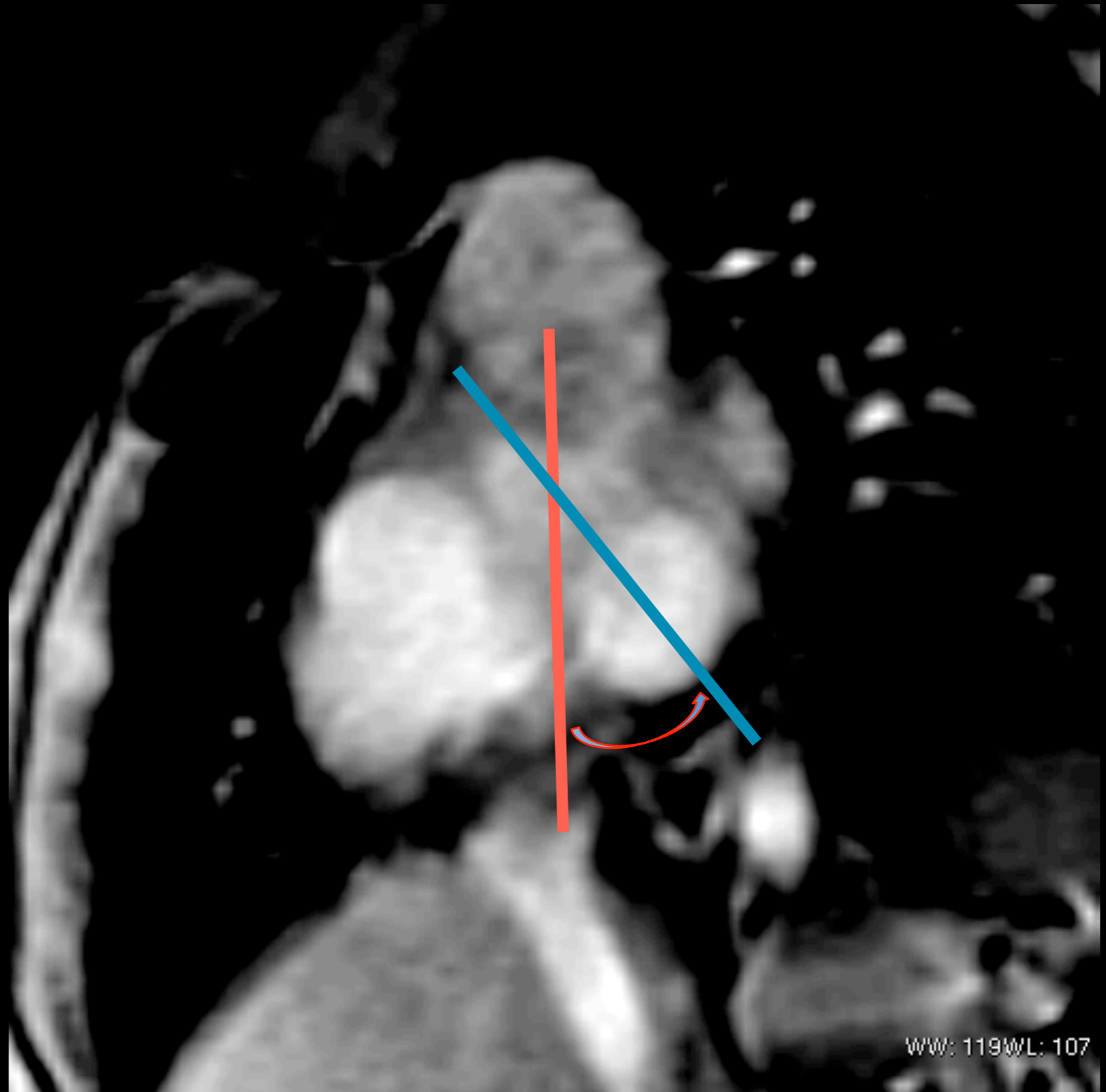


Straddling  
tricuspid  
valve



# Situs solitus

Ventricles: L-loop or left-hand topology  
Straddling tricuspid (left AV) valve

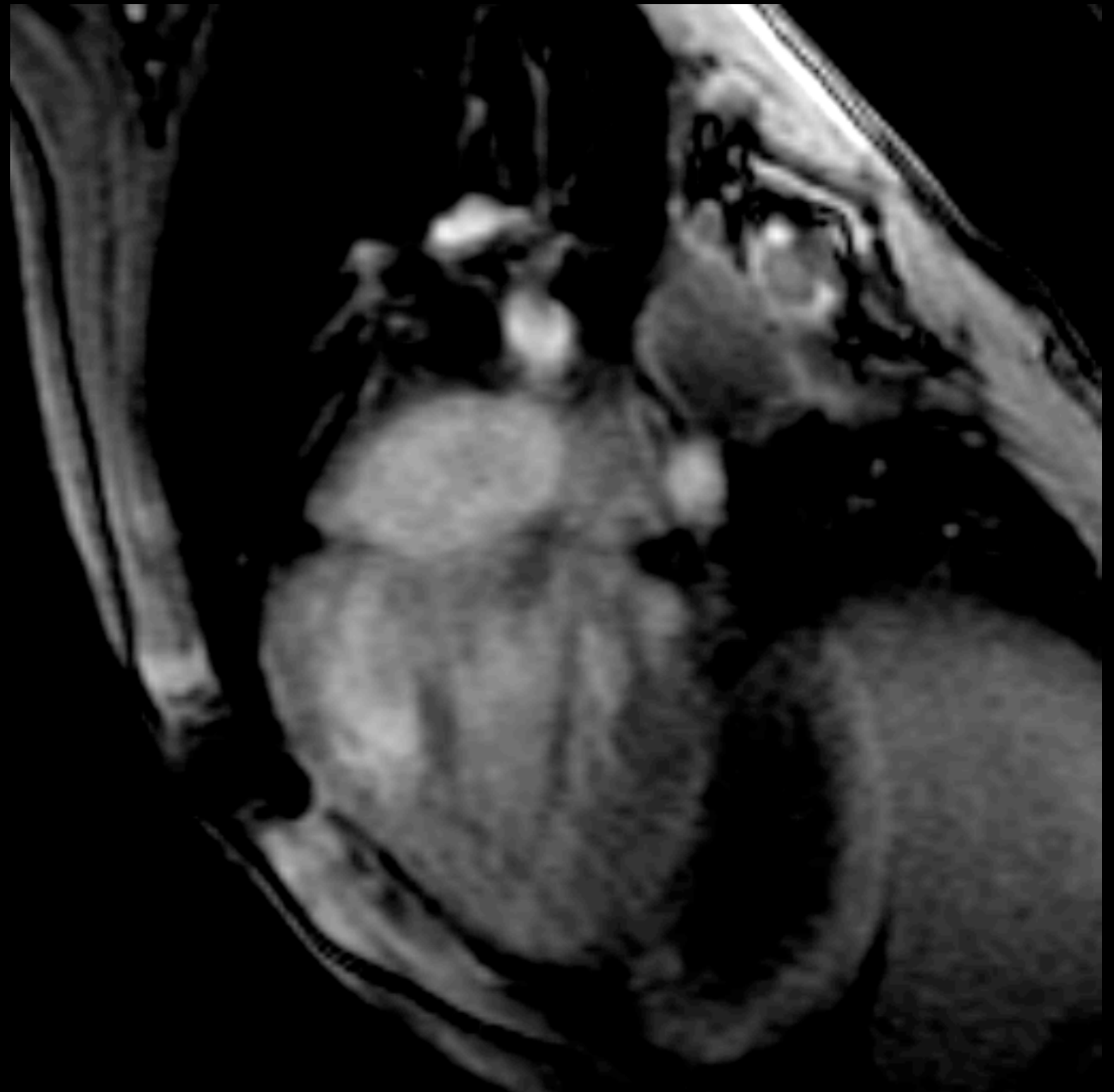
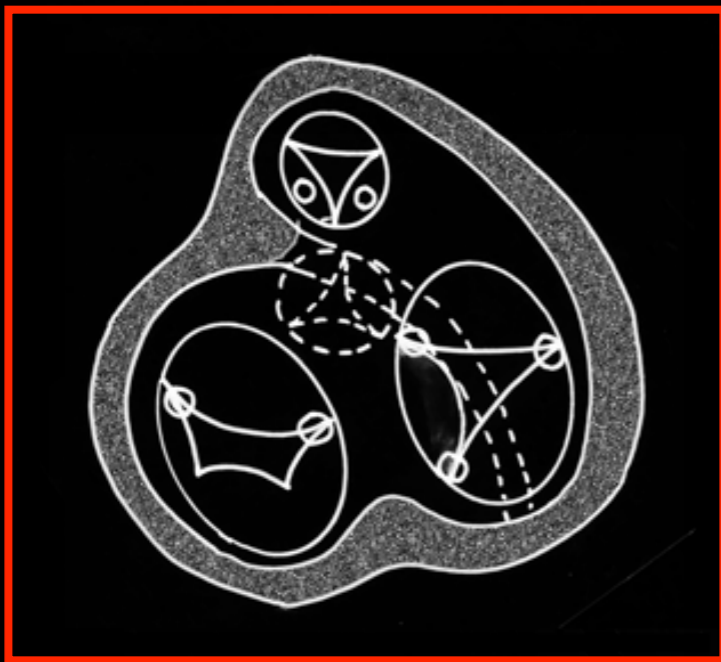




Situs solitus

Ventricles: L-loop or left-hand topology

Straddling tricuspid (left AV) valve

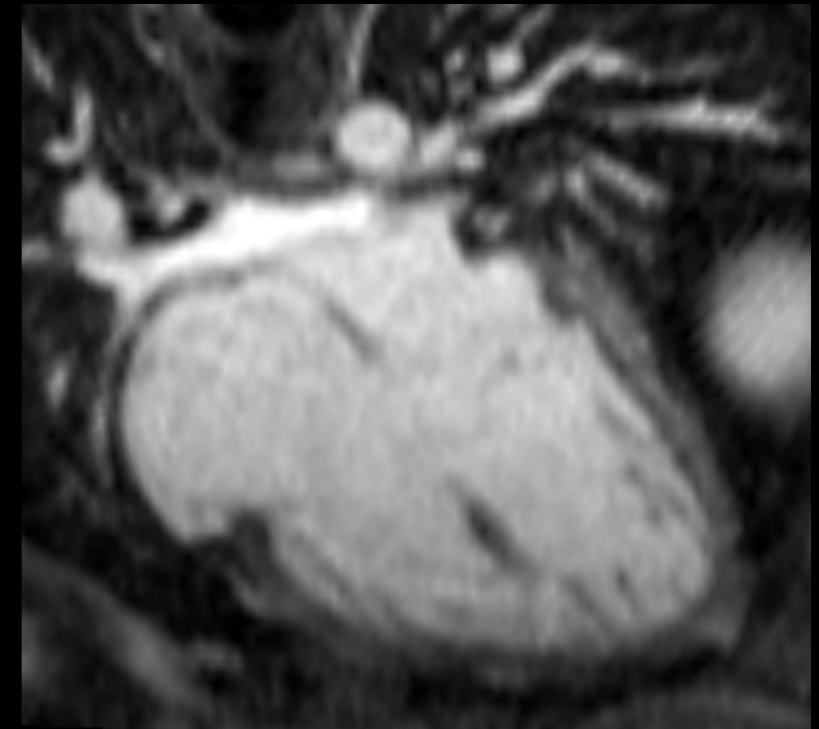




# Situs solitus

Ventricles: L-loop or left-hand topology

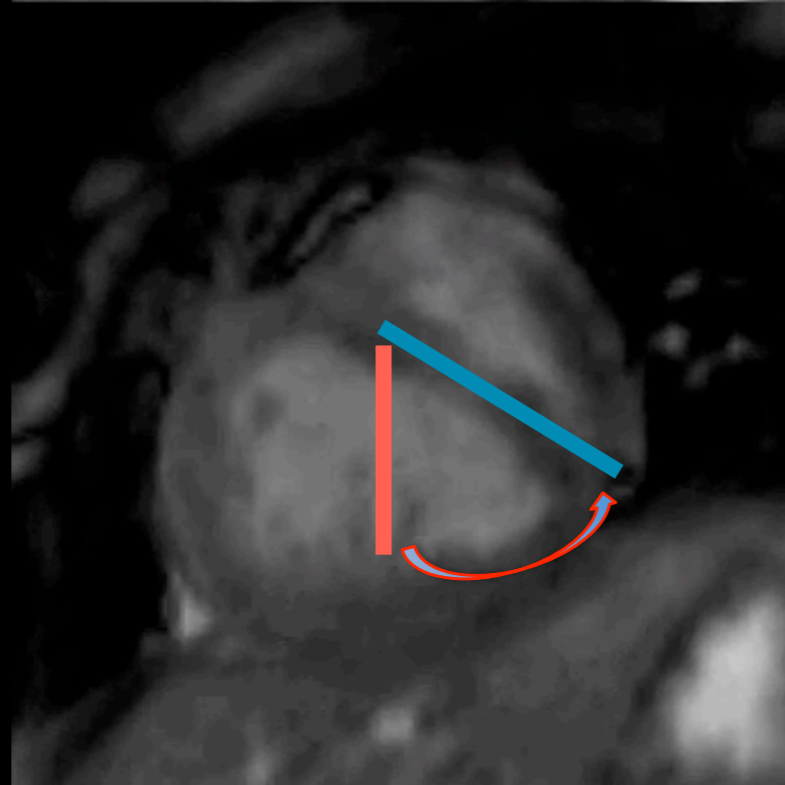
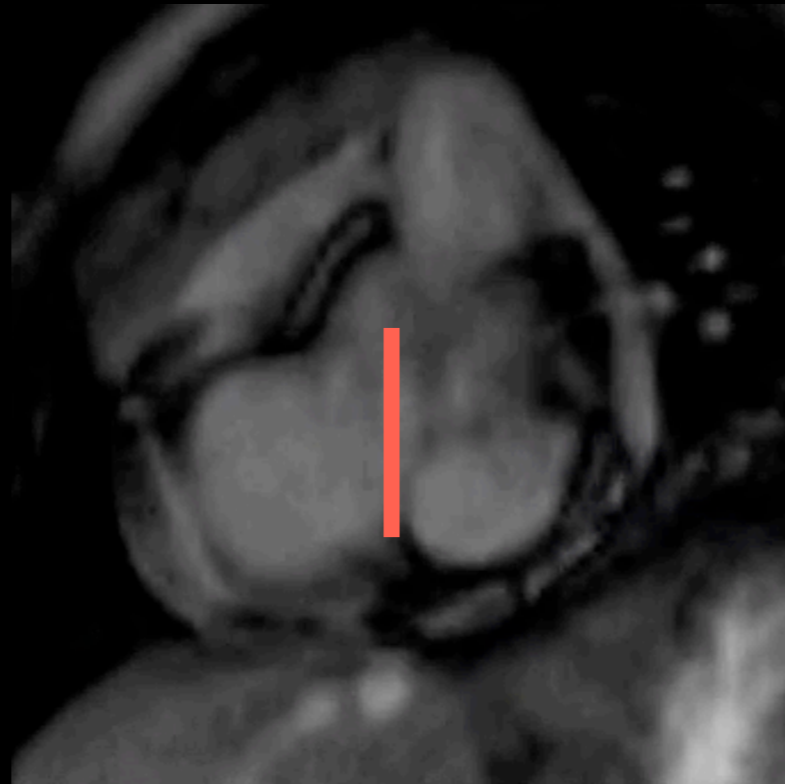
Double inlet left ventricle

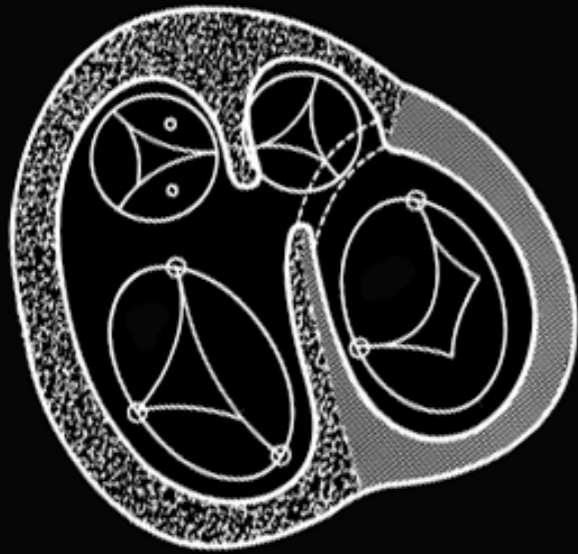


# Situs solitus

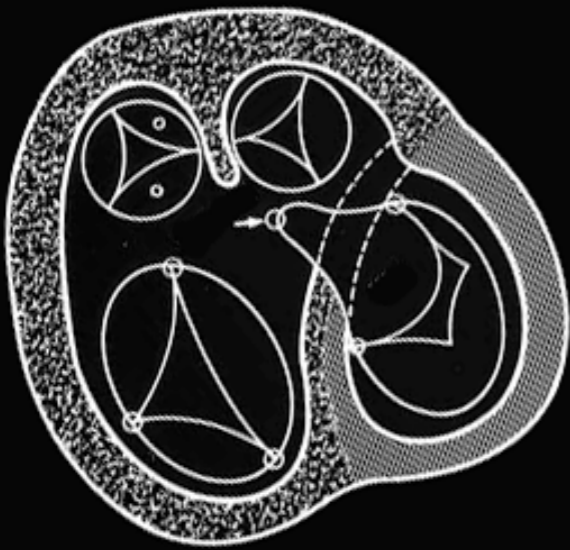
Ventricles: L-loop or left-hand topology

Double inlet left ventricle





Transposition of the great arteries



Straddling mitral Valve  
Double outlet right ventricle with  
sub pulmonary VSD



Double Inlet Left Ventricle  
Double outlet right ventricle

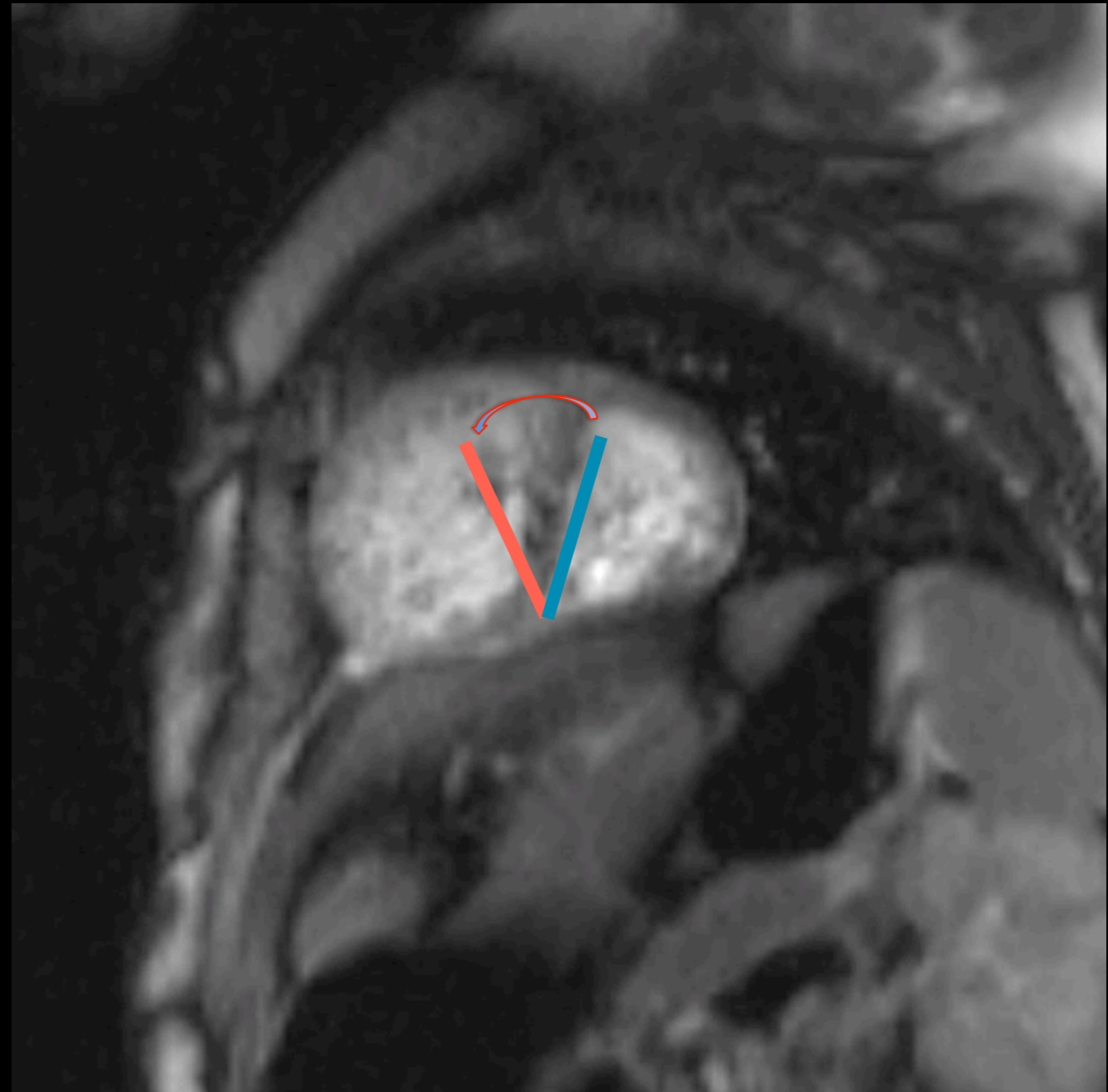
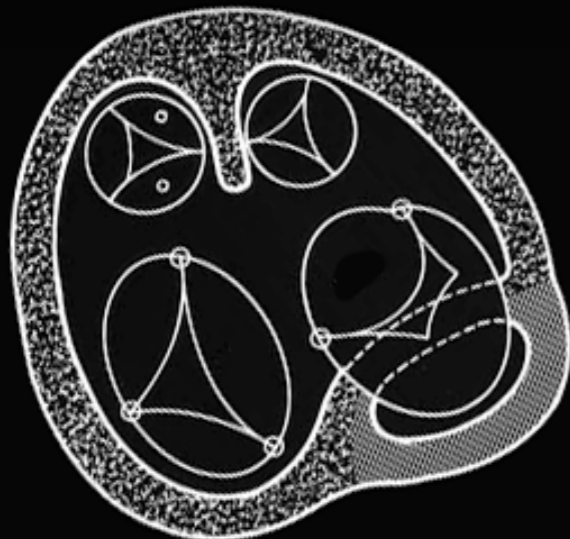
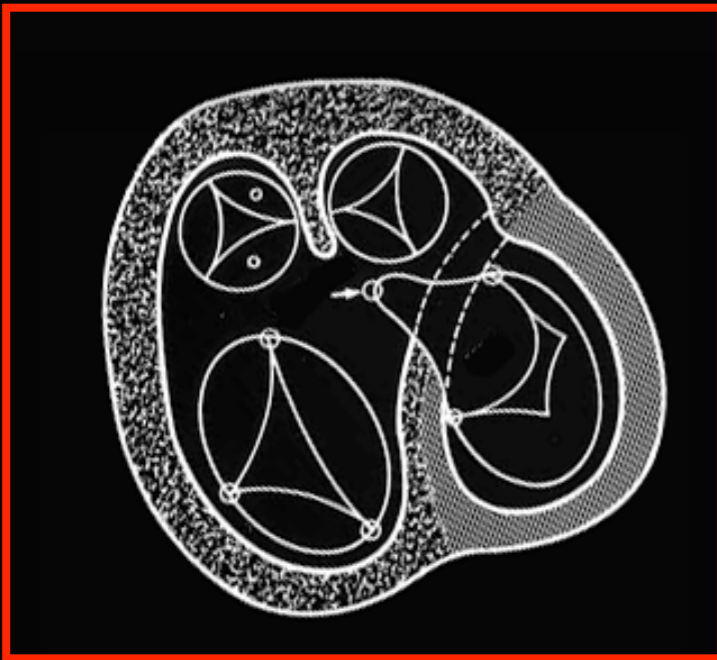
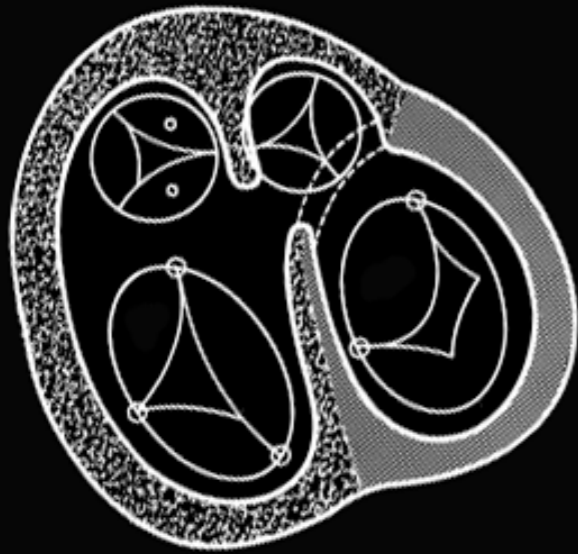


# Situs solitus

Normal ventricular relationship

Straddling mitral valve

DORV with sub pulmonary VSD

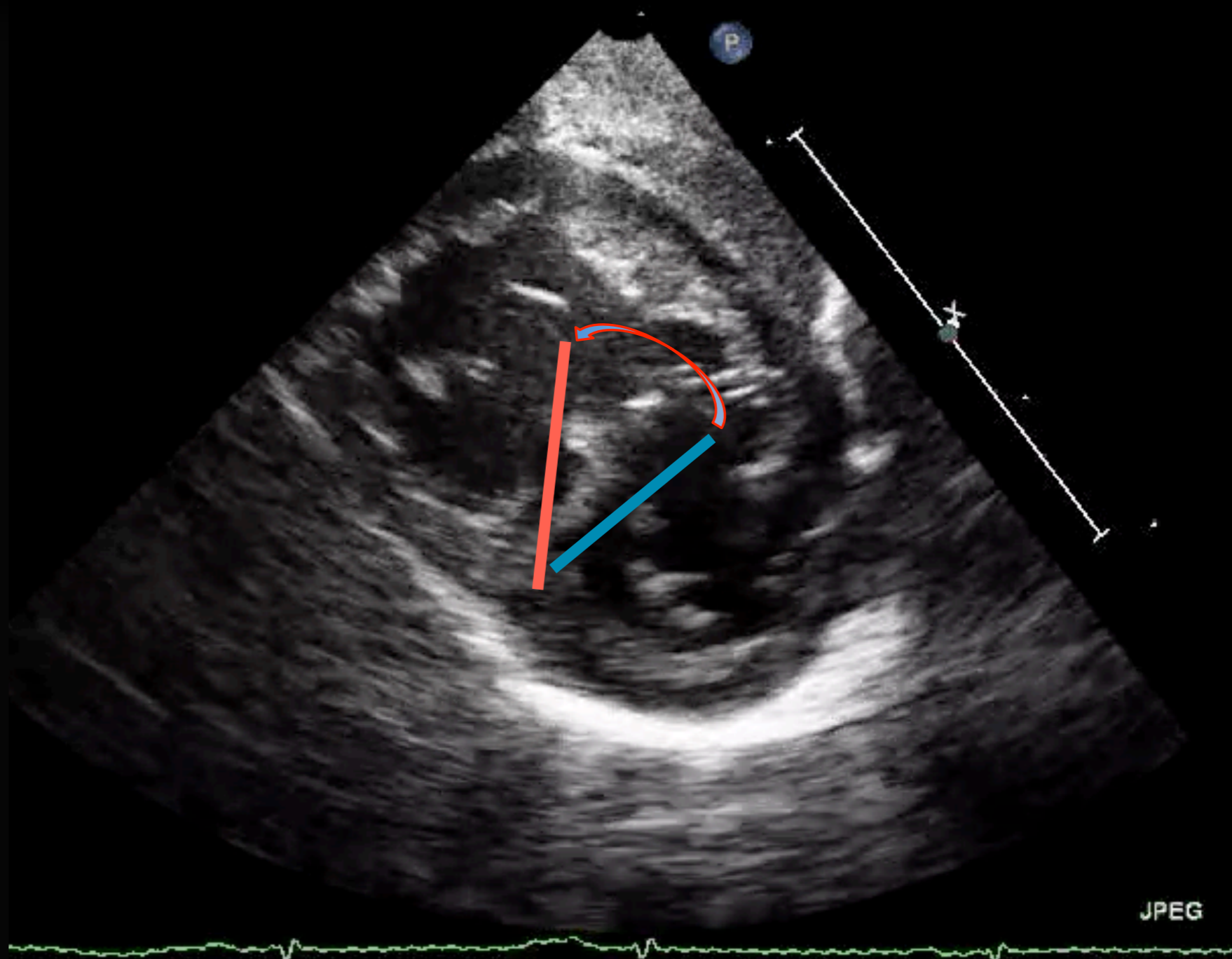
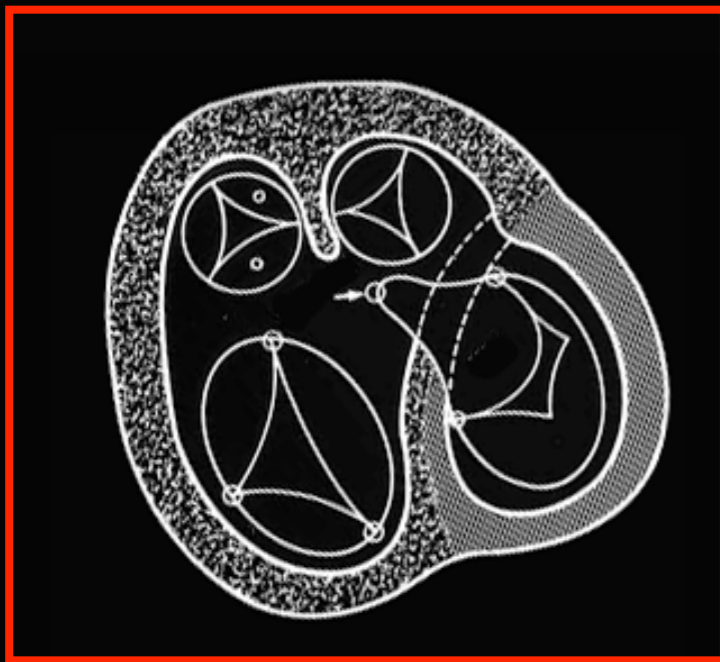
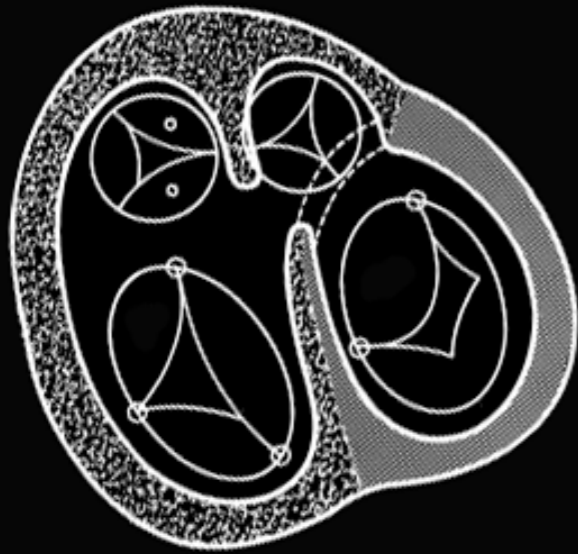


# Situs solitus

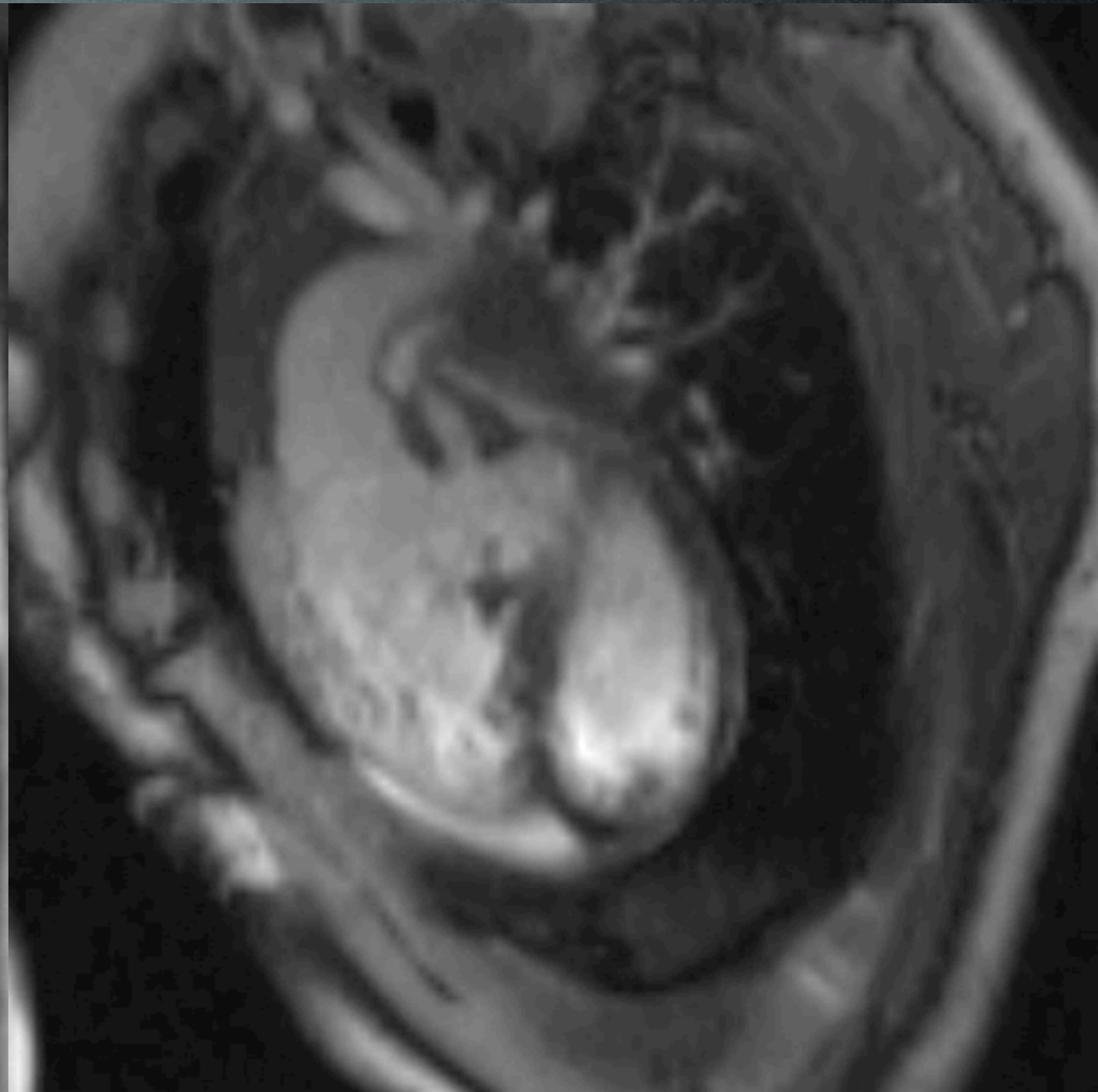
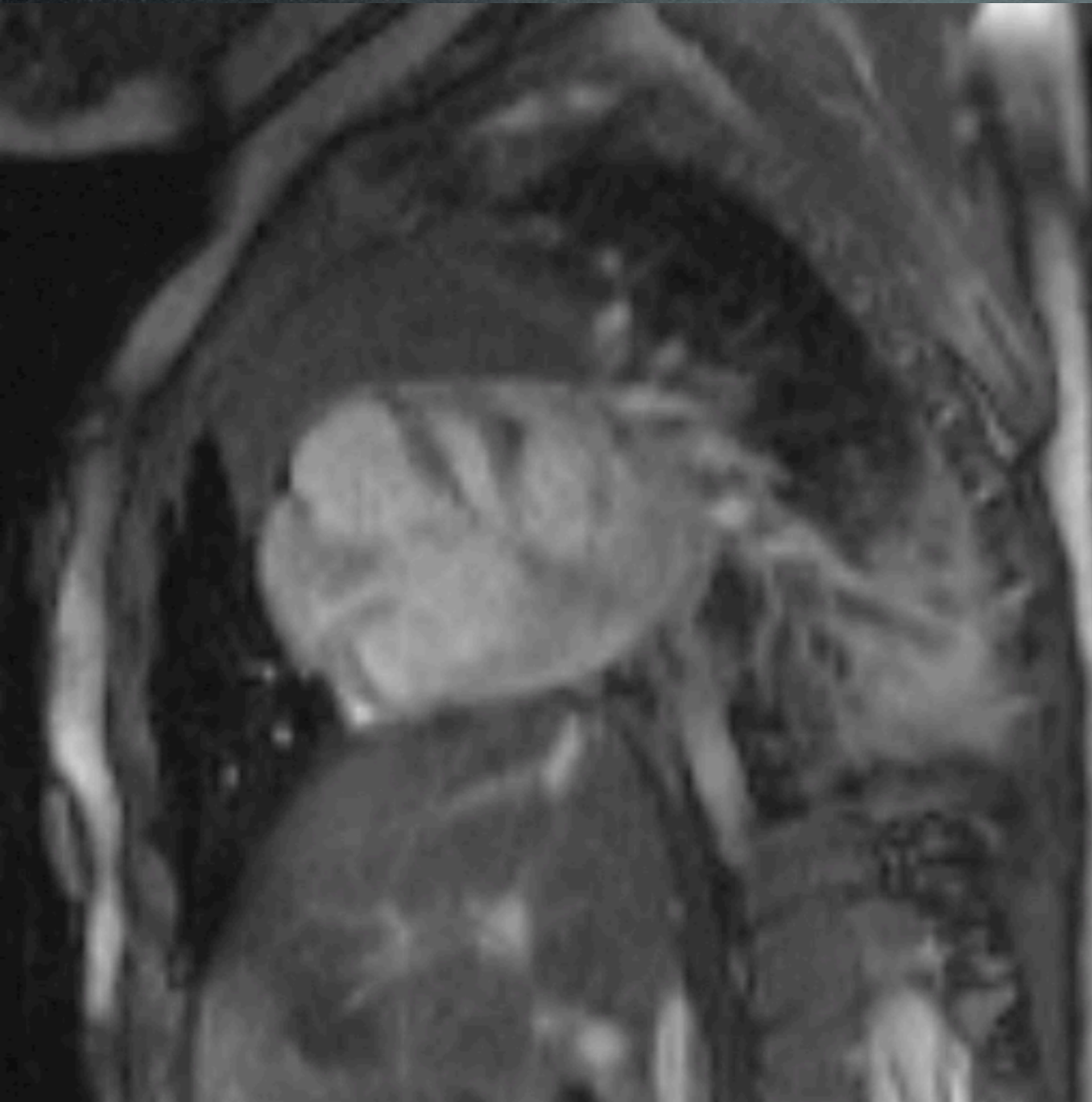
Normal ventricular relationship

Straddling mitral valve

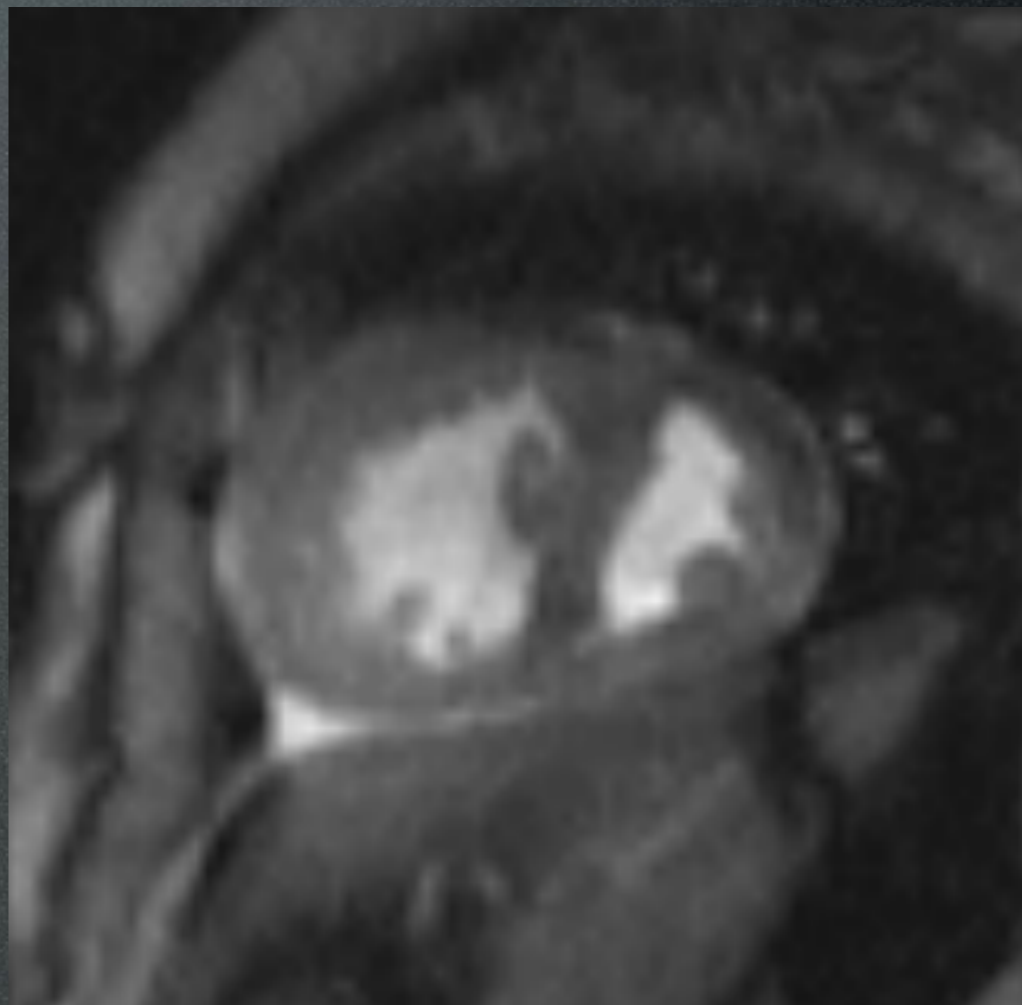
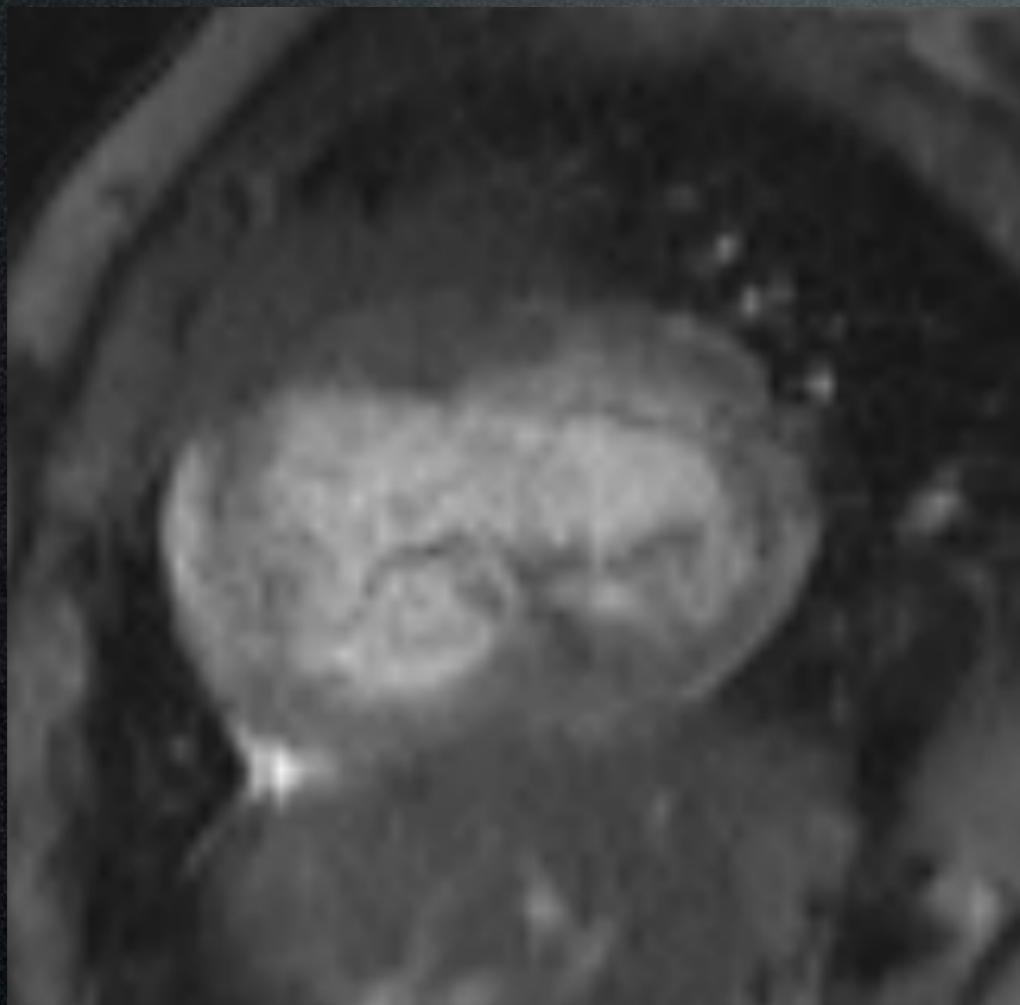
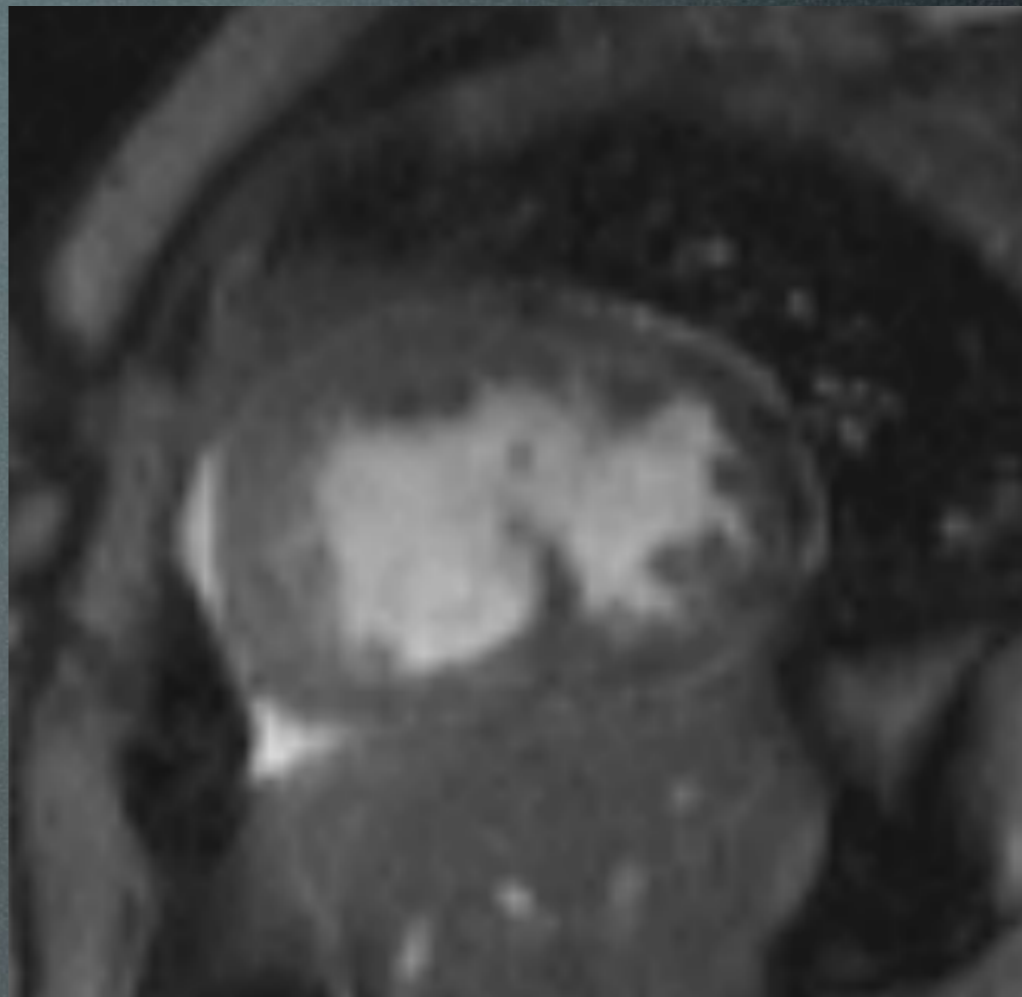
DORV with sub pulmonary VSD









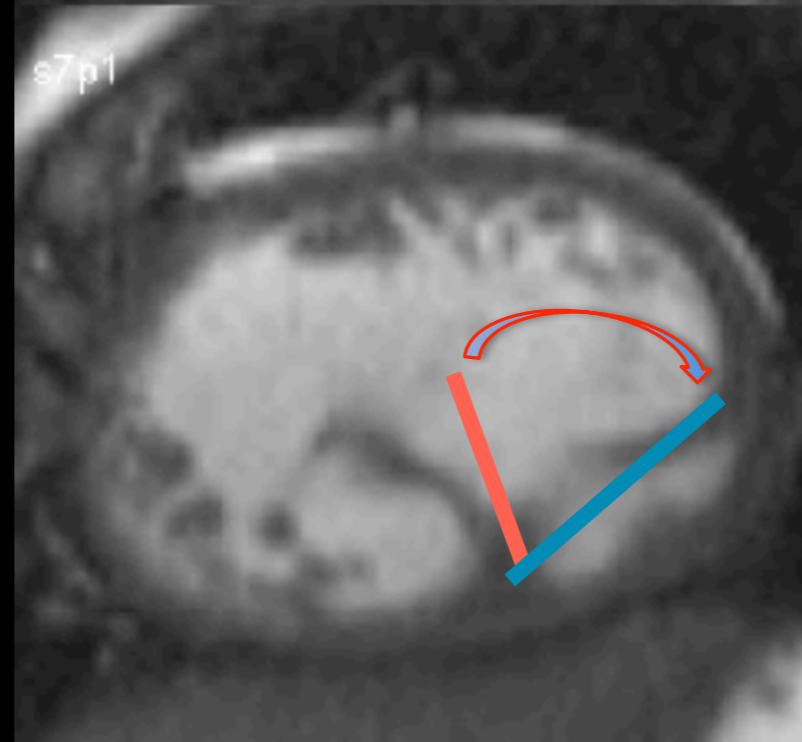
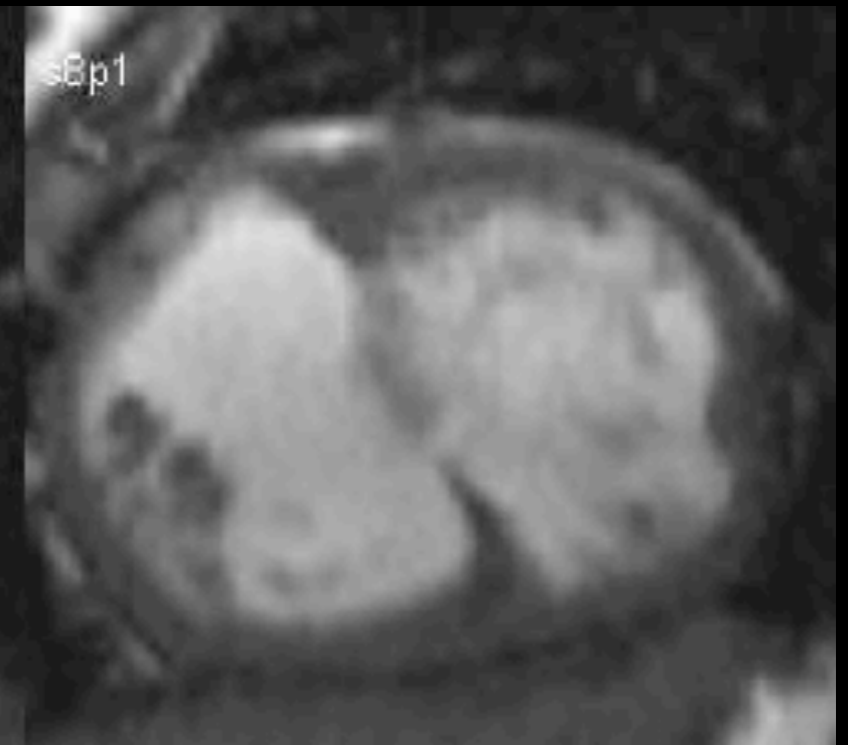
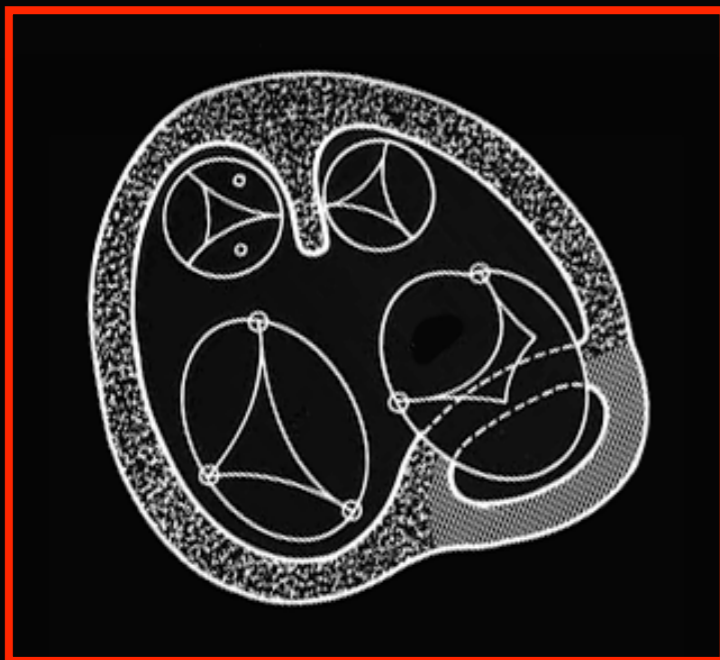
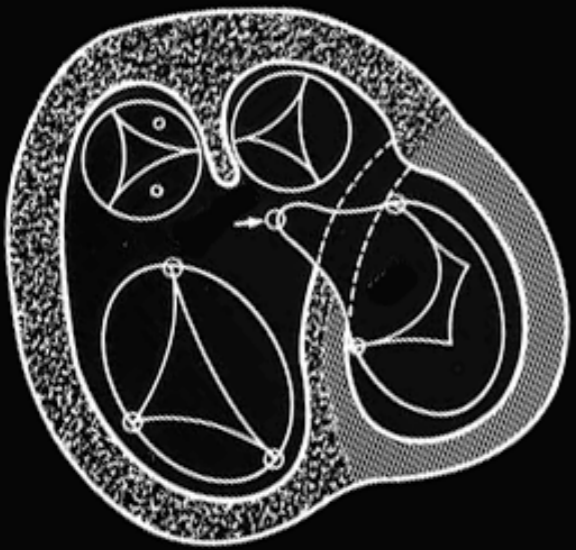
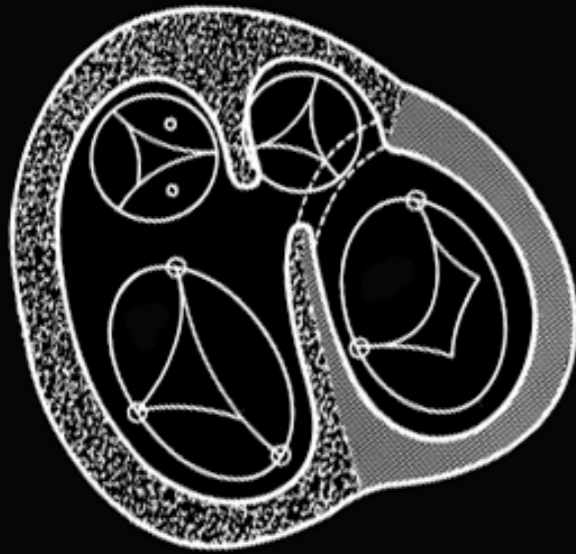


# Situs solitus

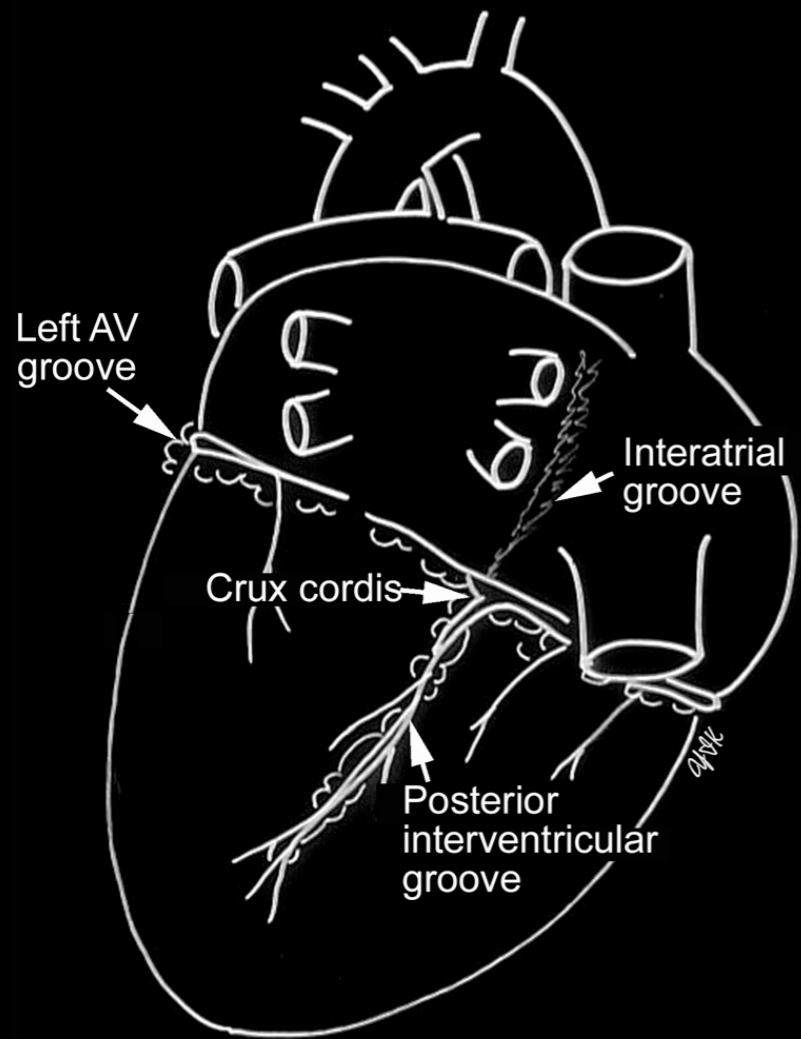
Normal ventricular relationship

Double inlet right ventricle

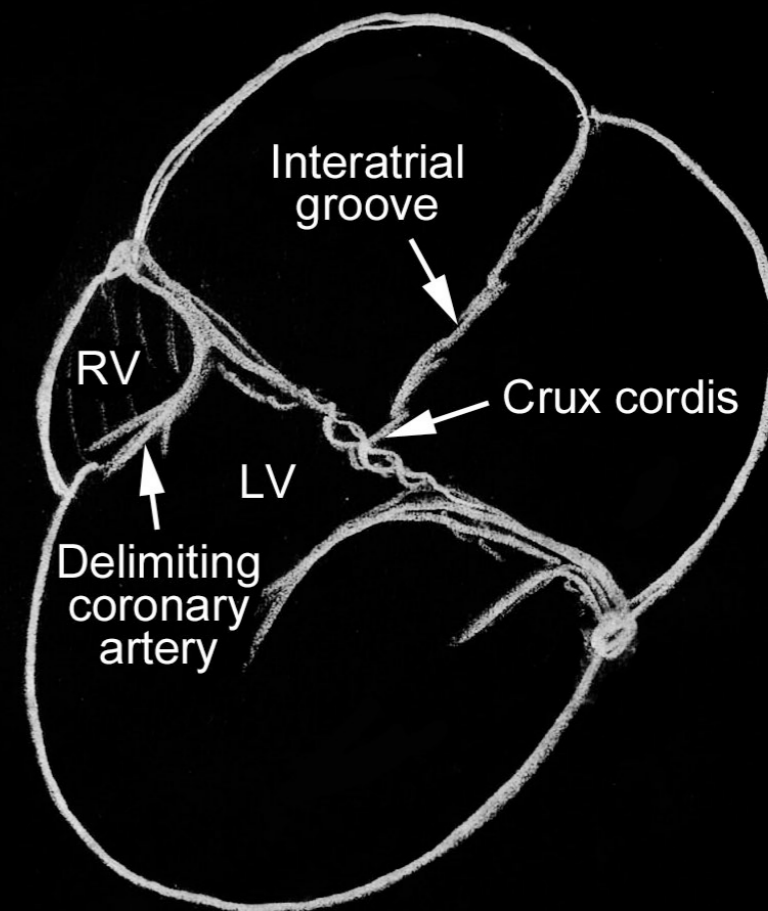
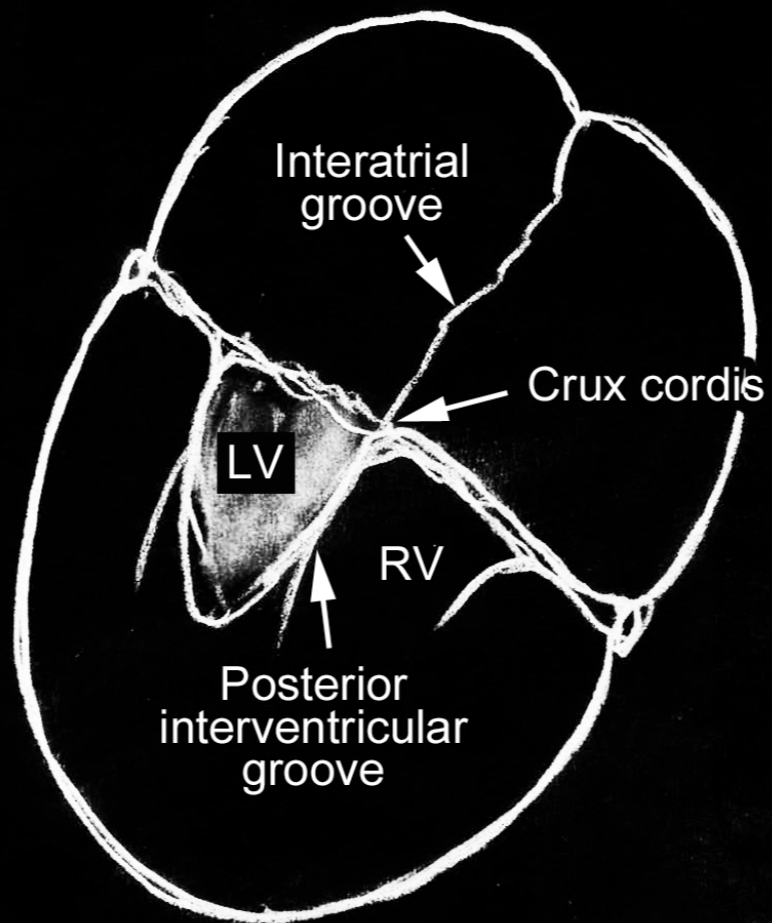
Double outlet right ventricle



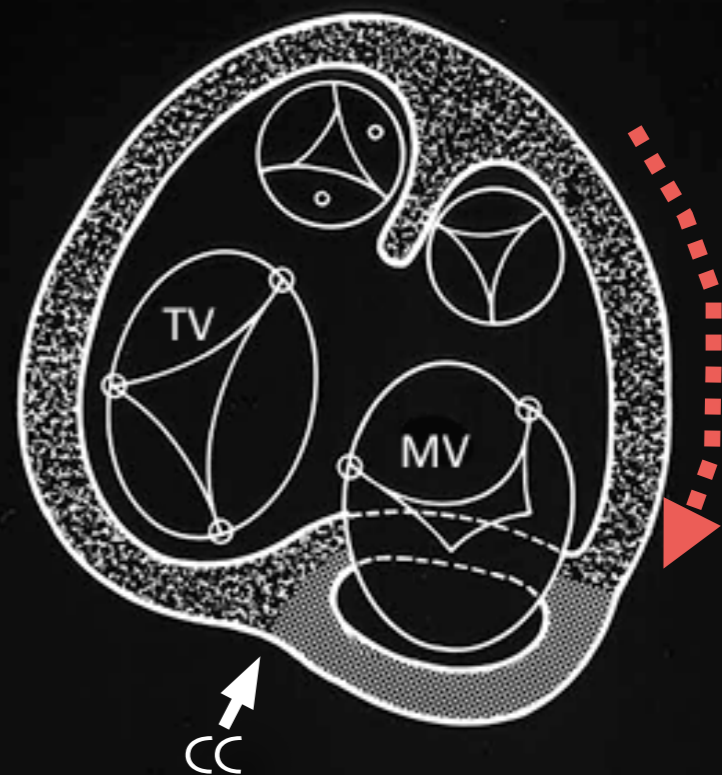
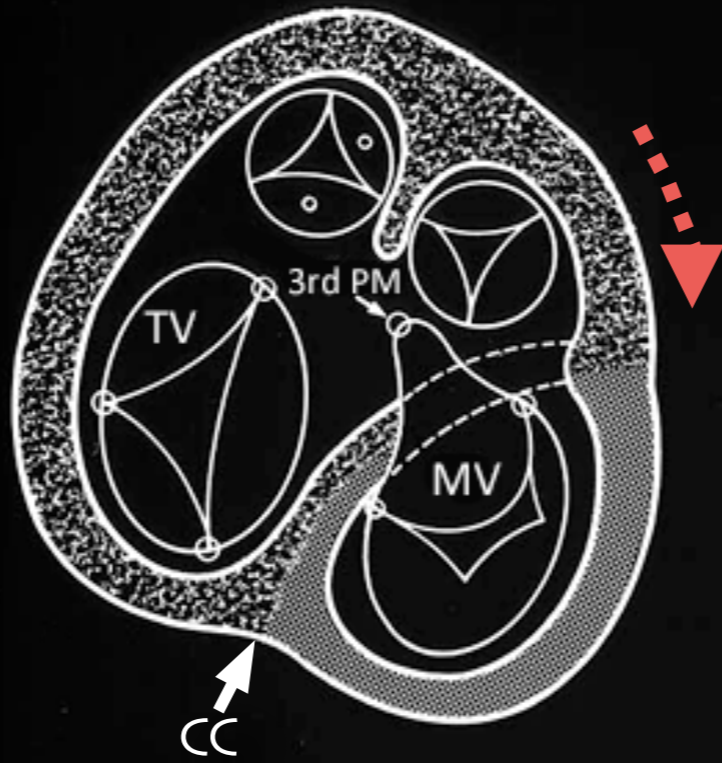
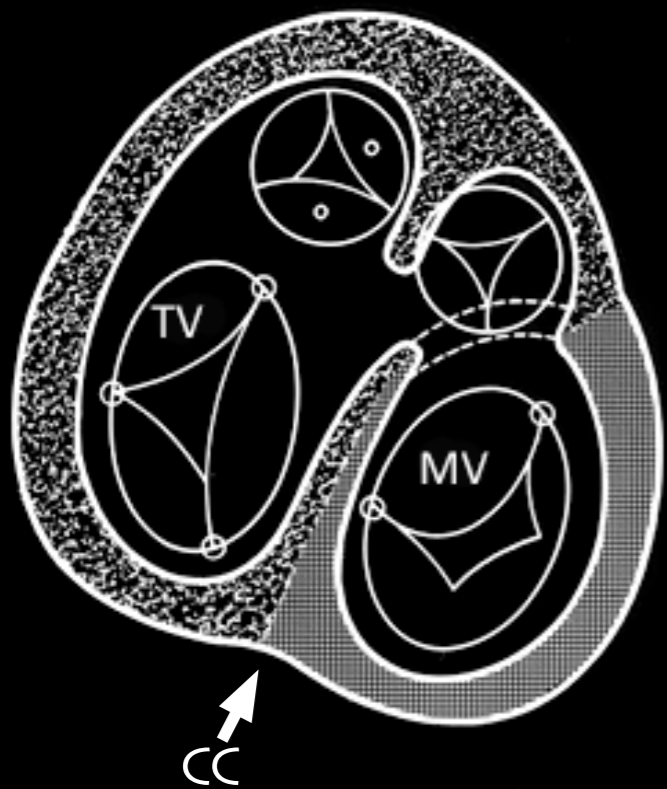
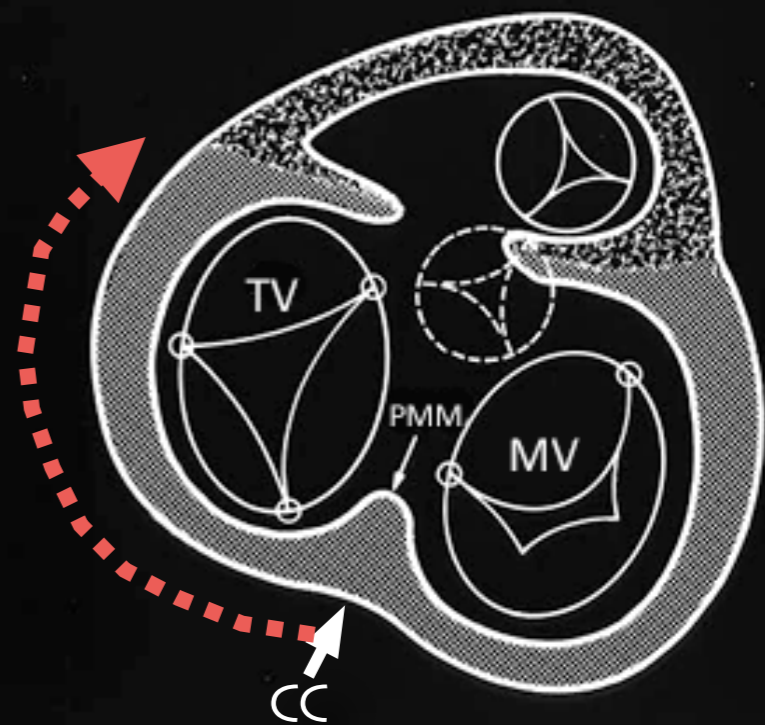
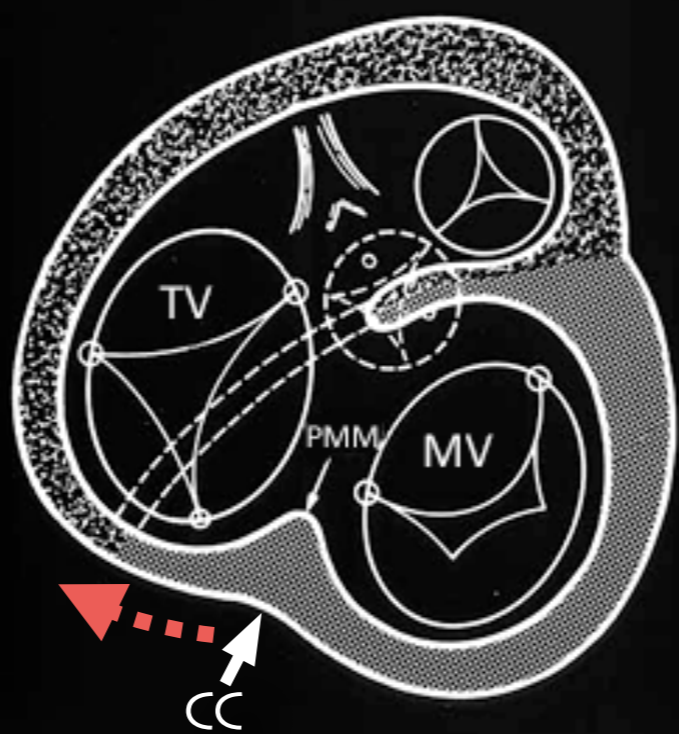
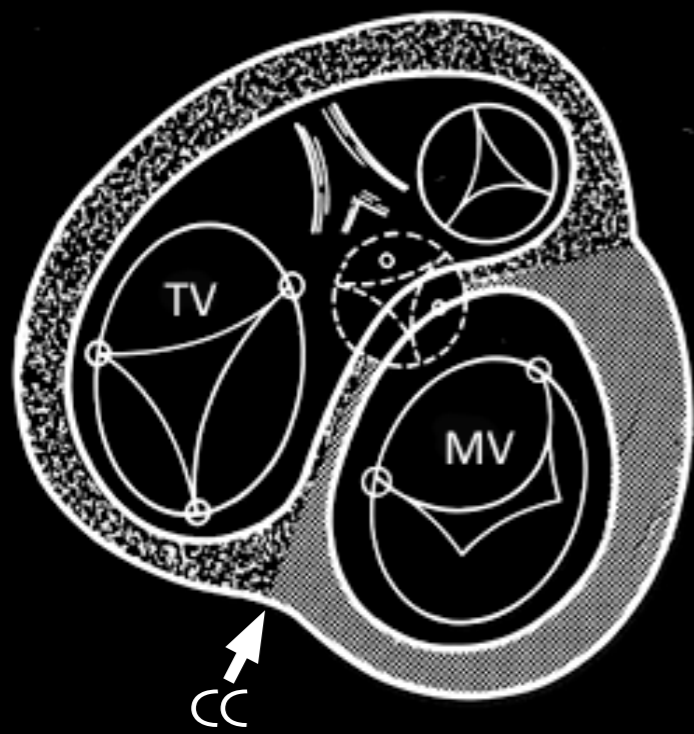


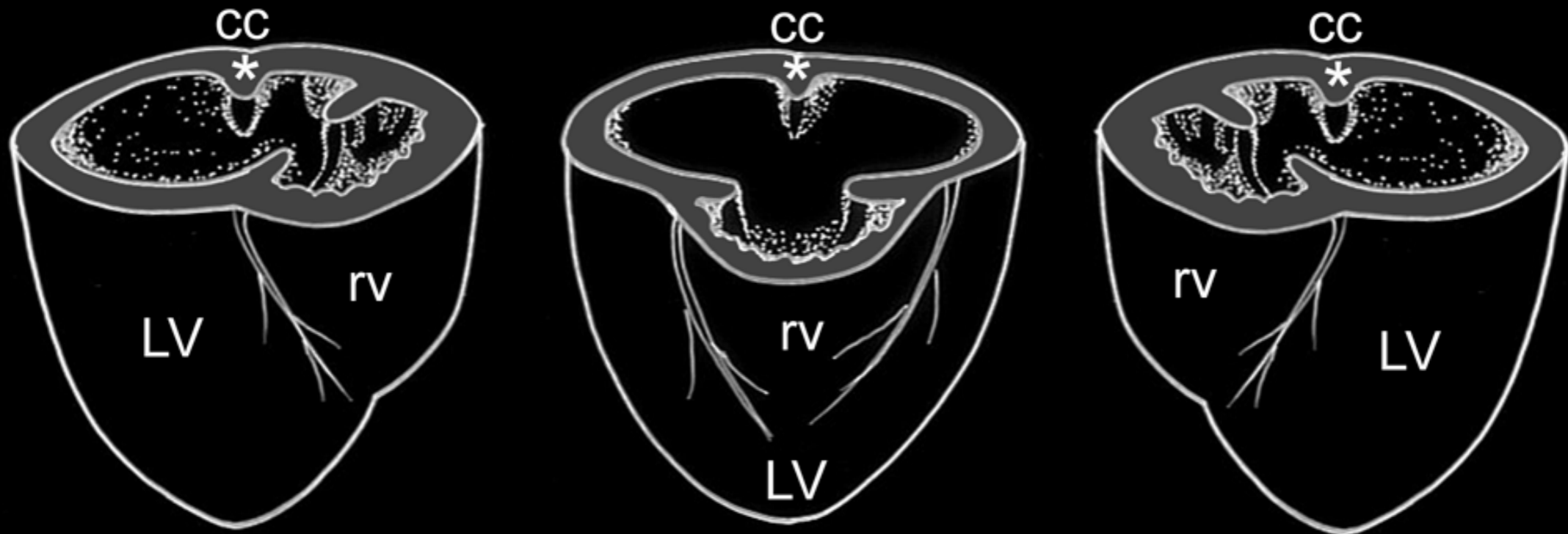


## Crux cordis

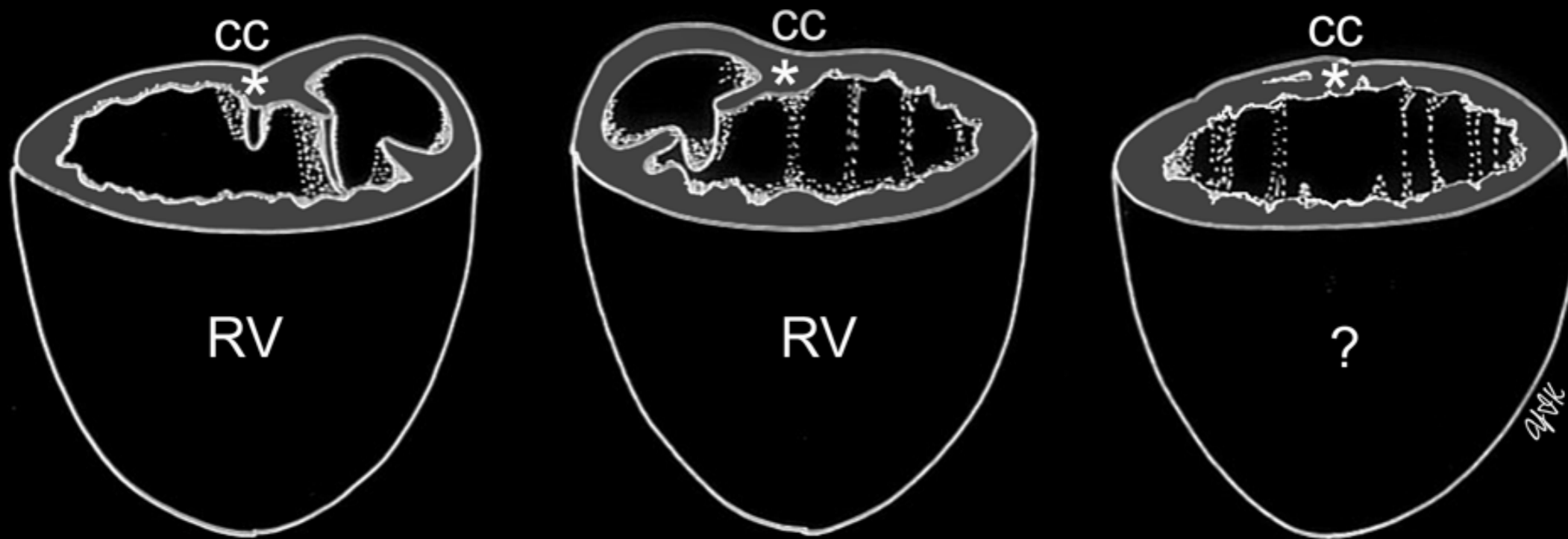








Main chamber with left ventricular morphology  
**Single LV**

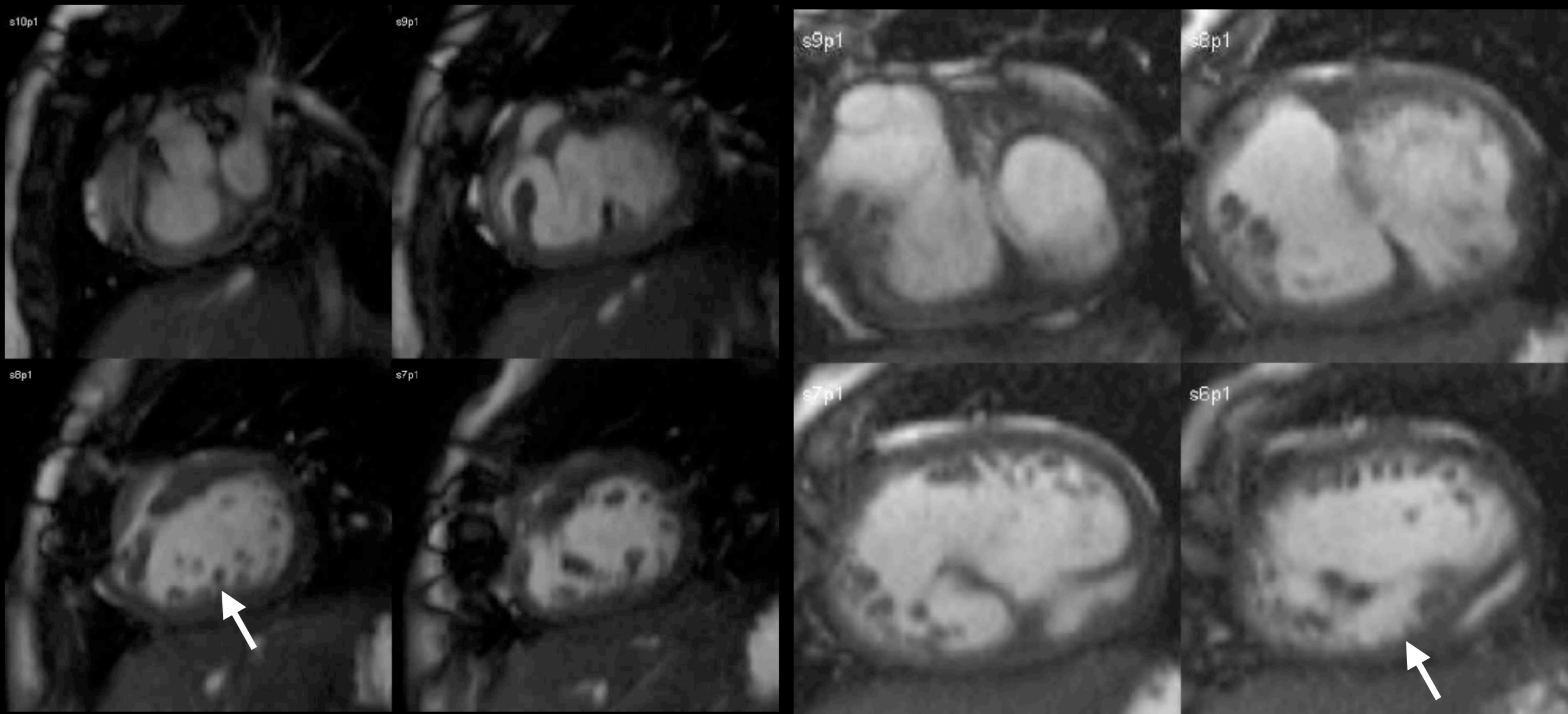


Main chamber with  
 right ventricular morphology  
**Single RV**

Solitary ventricle of  
 indeterminate morphology

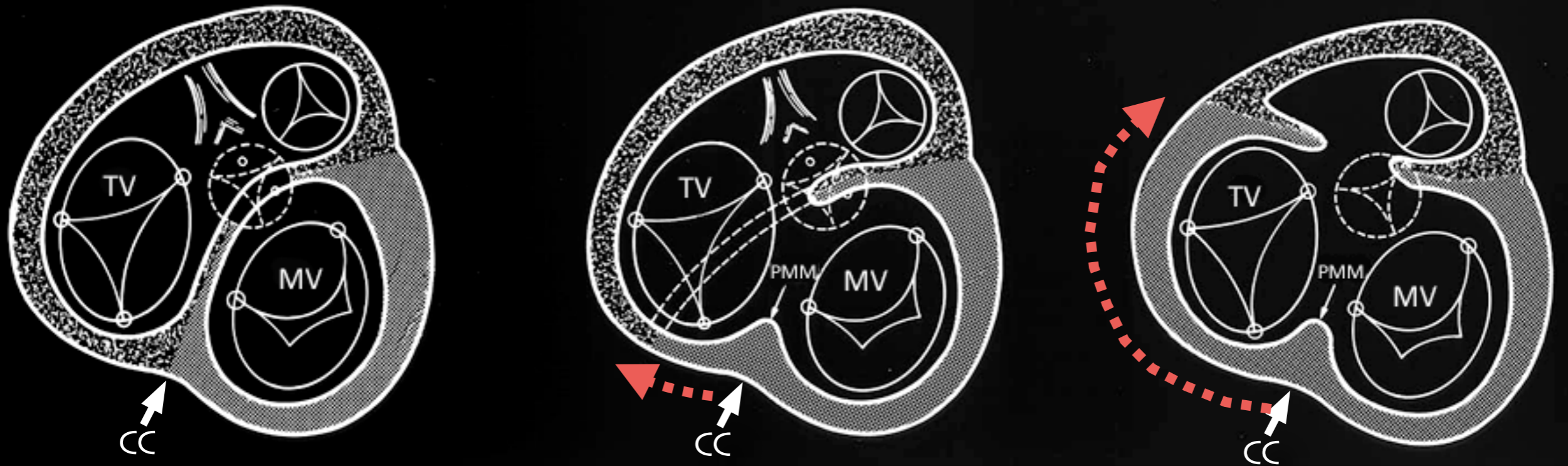


# RUDIMENTARY RIGHT vs LEFT VENTRICLE





# VSD-DILV SPECTRUM



**Malaligned part:** Ventricular septum

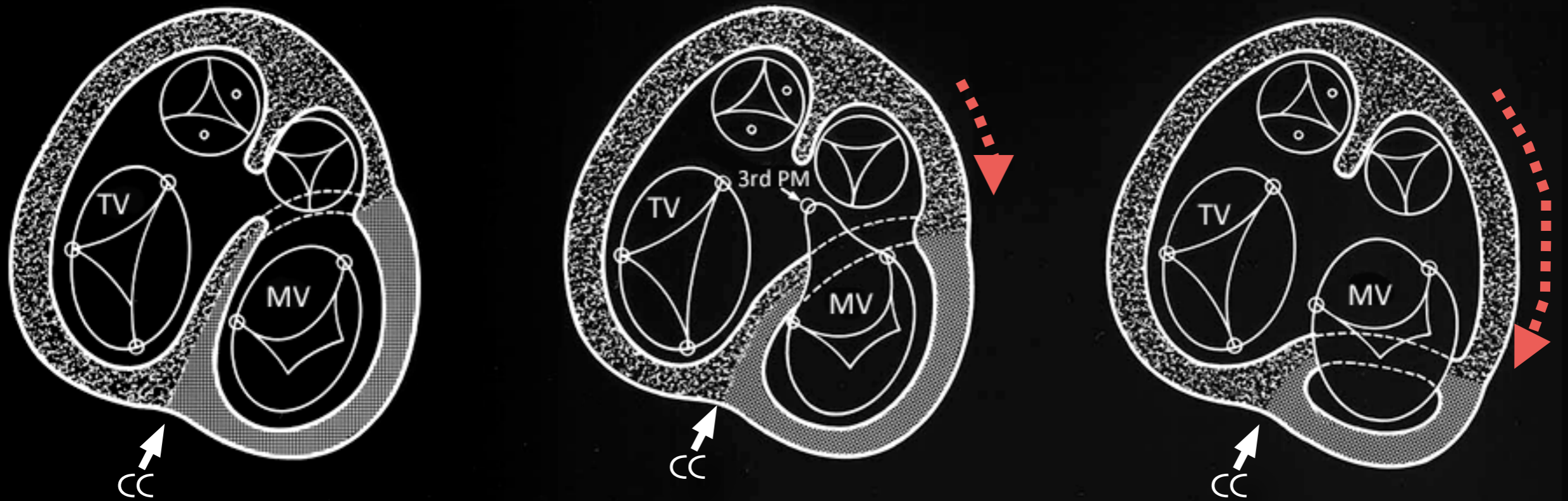
**Mechanism:** Flap door with hinge on the front

**Reference structure:** Atrial septum, posteriorly at crux c.

**Direction:** Rightward and forward

**Extent:** 30% versus 100% overriding TV

# TGA-DIRV SPECTRUM



**Malaligned part:** Ventricular septum

**Mechanism:** Flap door with hinge on the back (CC)

**Reference structure:** Atrial septum, anteriorly

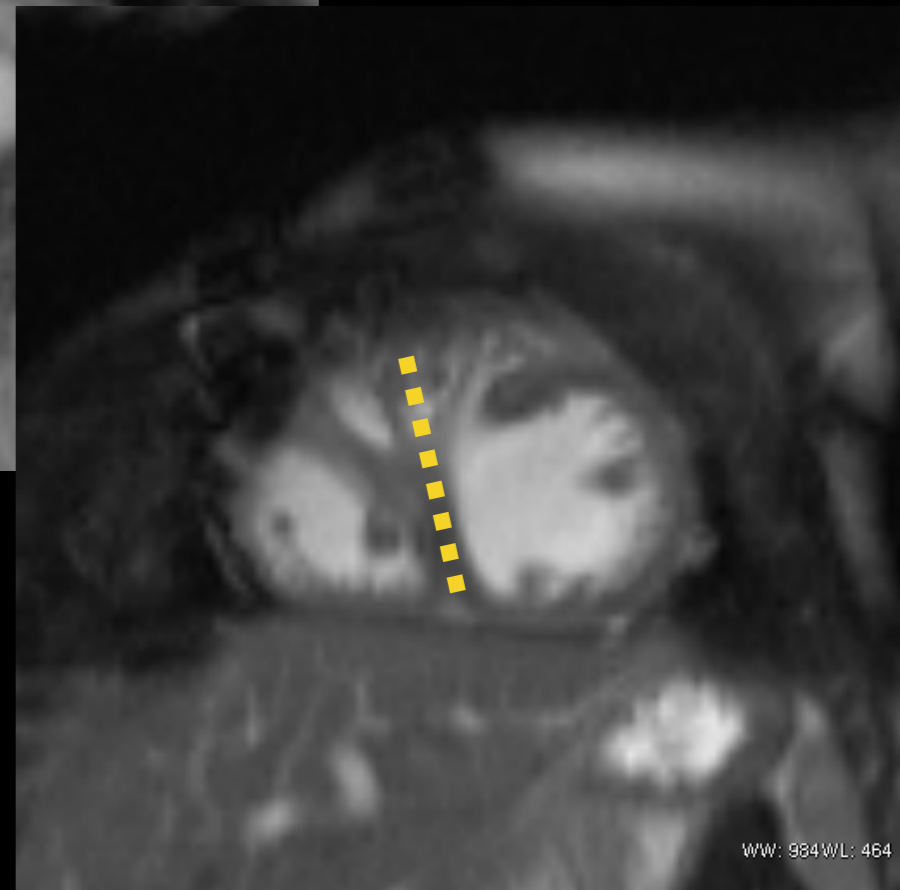
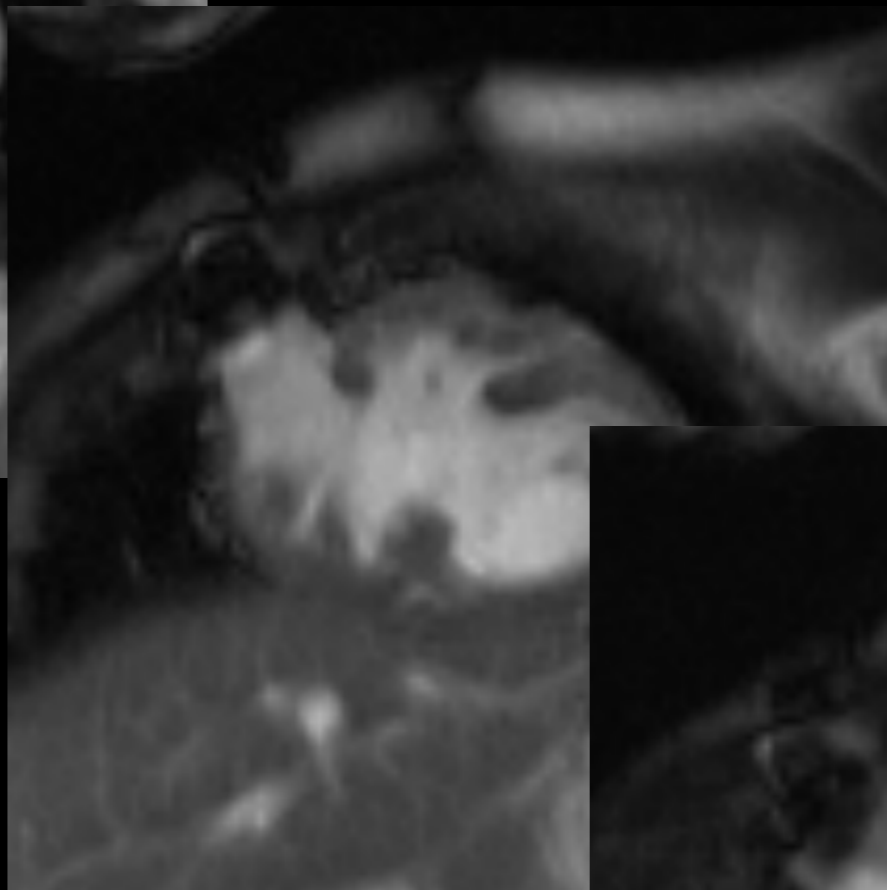
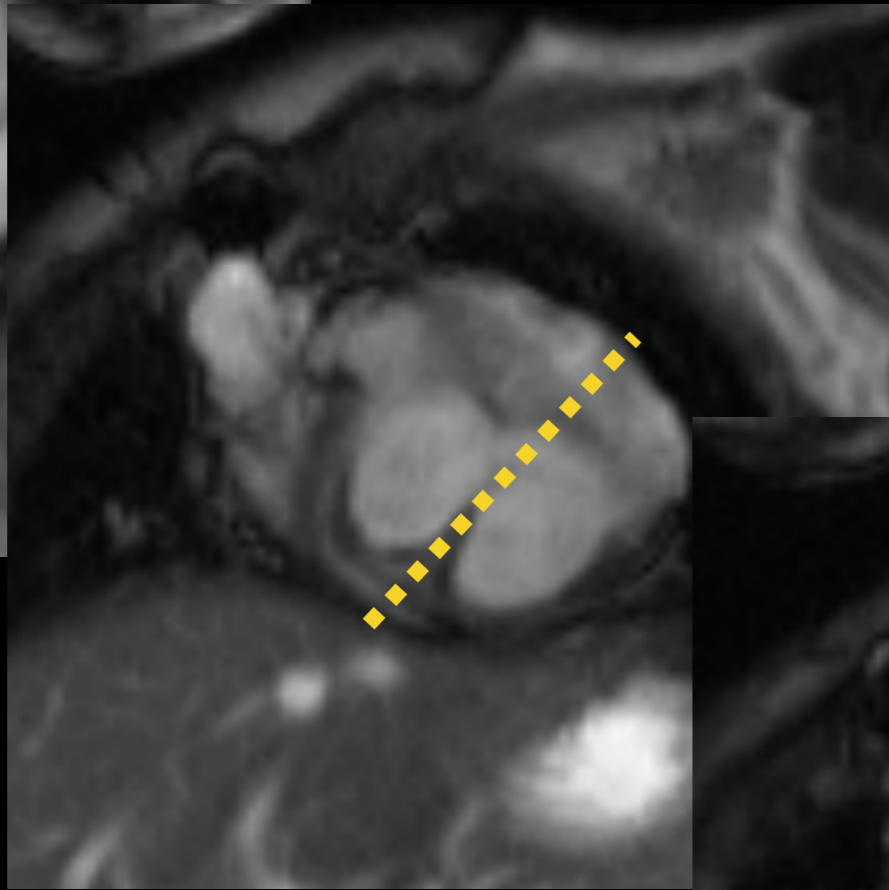
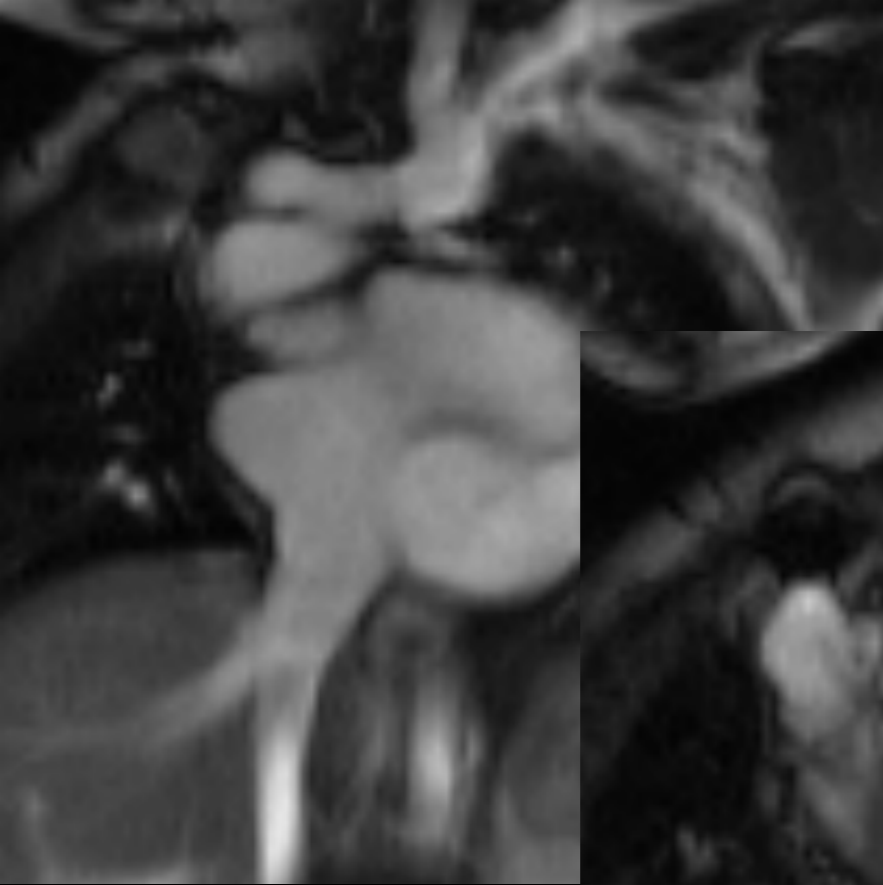
**Direction:** Leftward and backward

**Extent:** Minimal versus 100% overriding MV



Tricuspid valve straddling in DORV with left juxtaposition of atria appendages



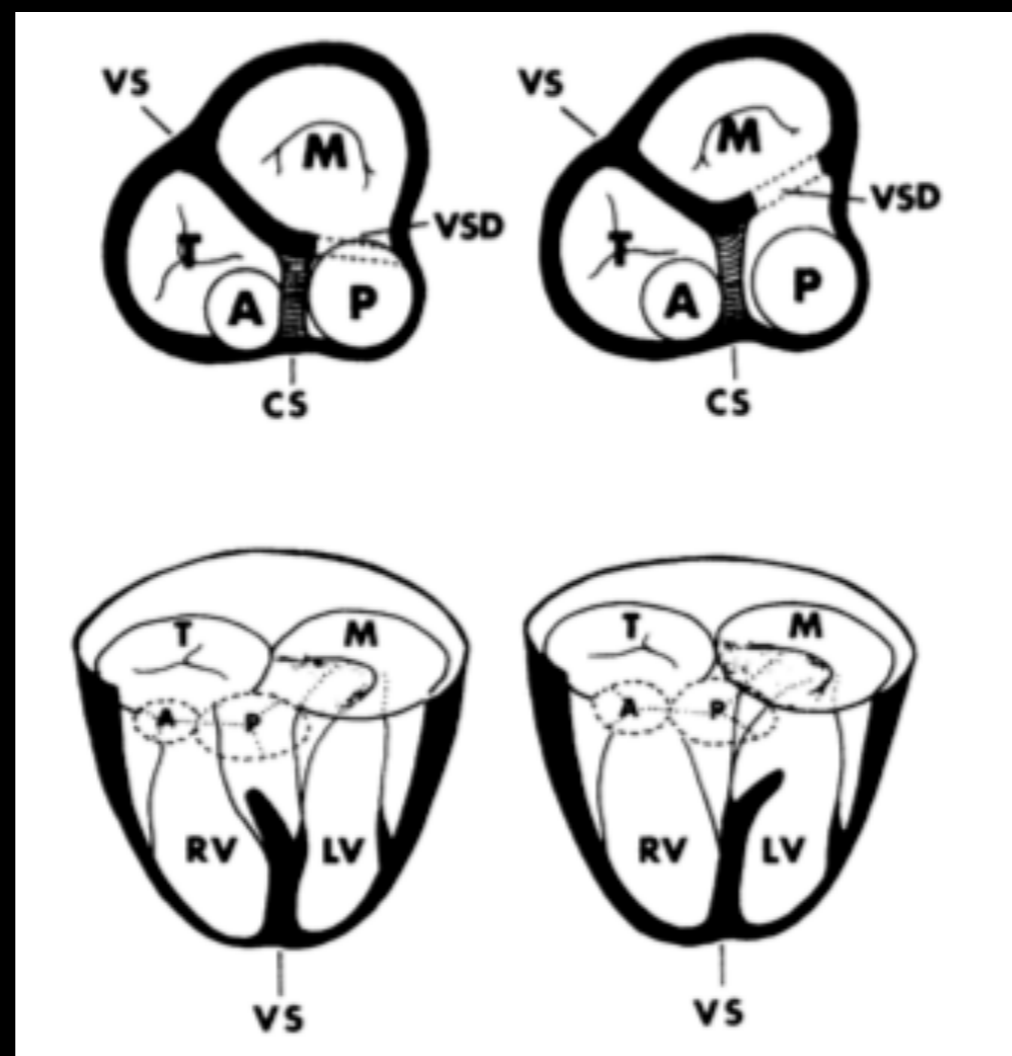


# Taussig-Bing Heart with Mitral Valve Straddling

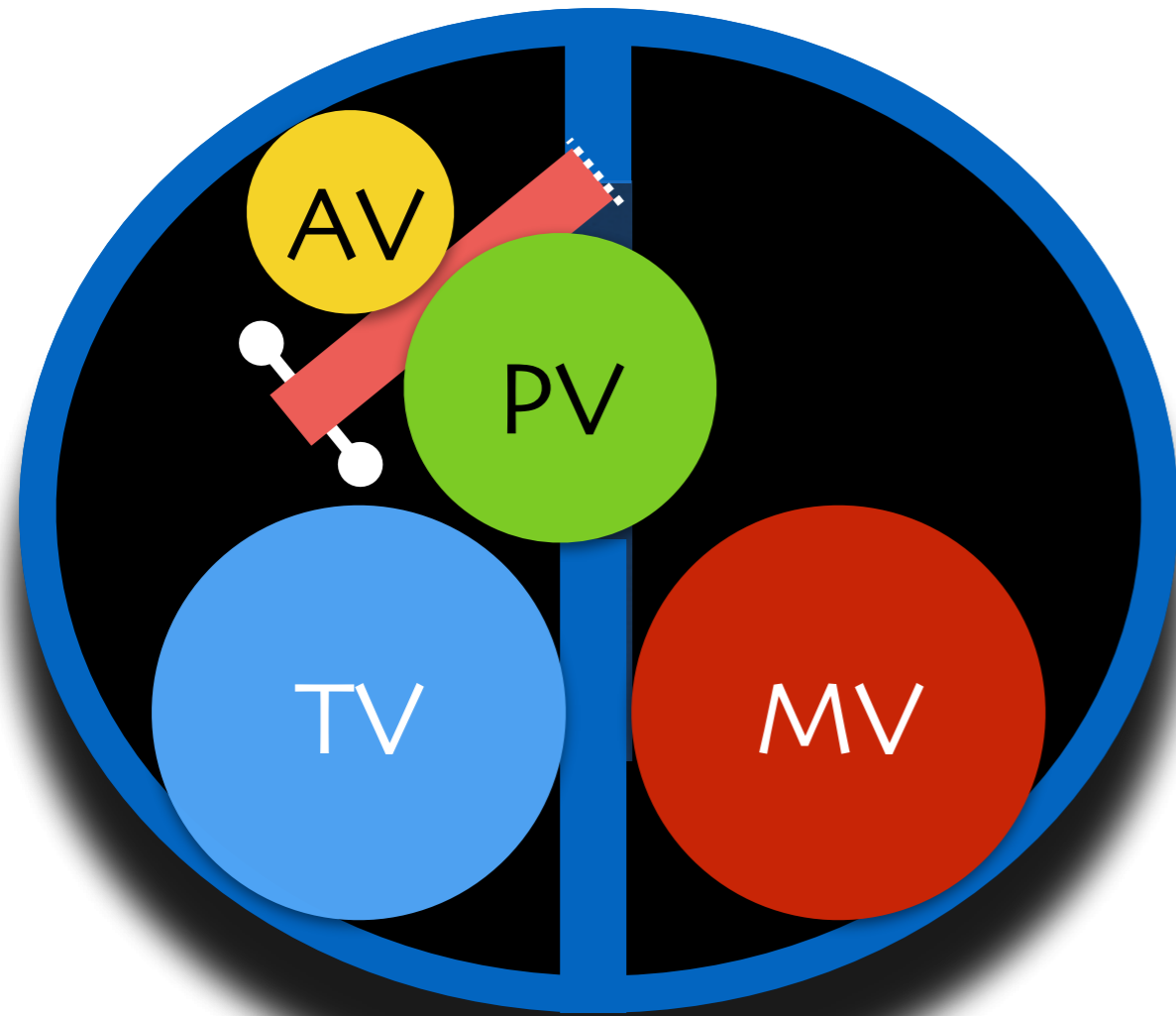
## Case Reports and Postmortem Study

By NOBUO KITAMURA, M.D., ATSUYOSHI TAKAO, M.D., MASAHIKO ANDO, M.D.,  
YASUHARU IMAI, M.D., AND SOJI KONNO, M.D.

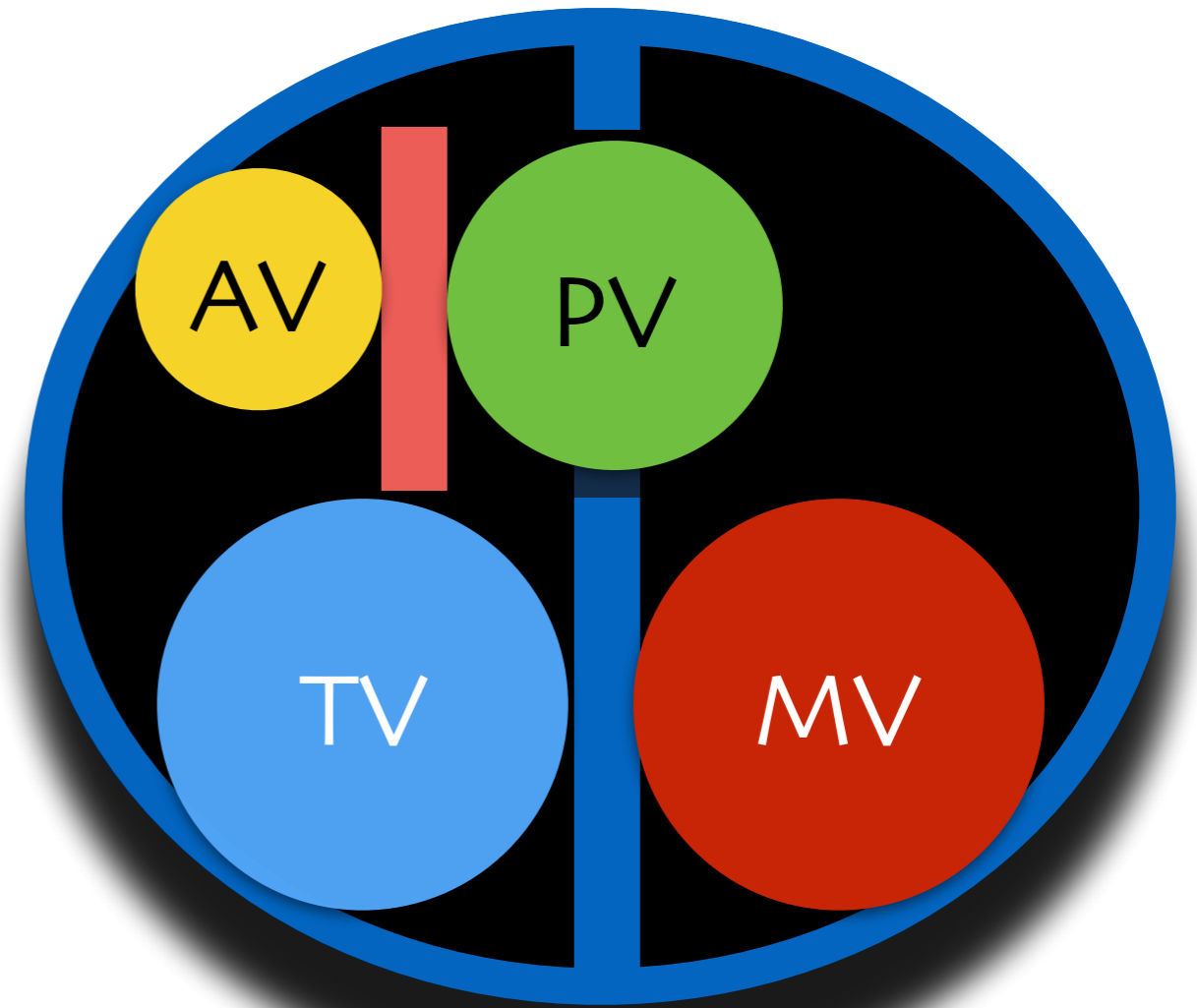
*Circulation, Volume XLIX, April 1974 761-76*



# Outlet septal malalignment relative to the rest of the ventricular septum

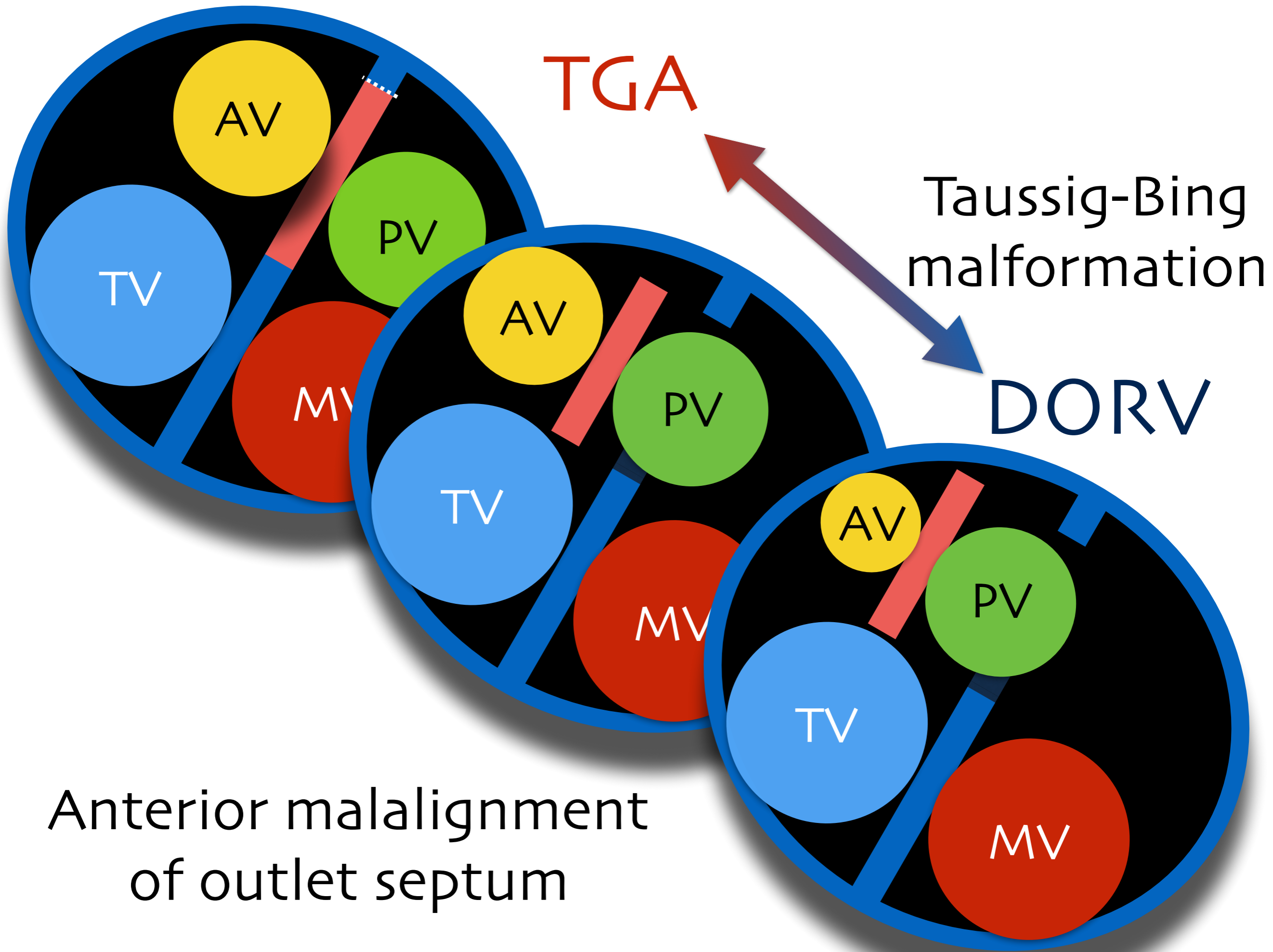


Flap door mechanism



En bloc displacement



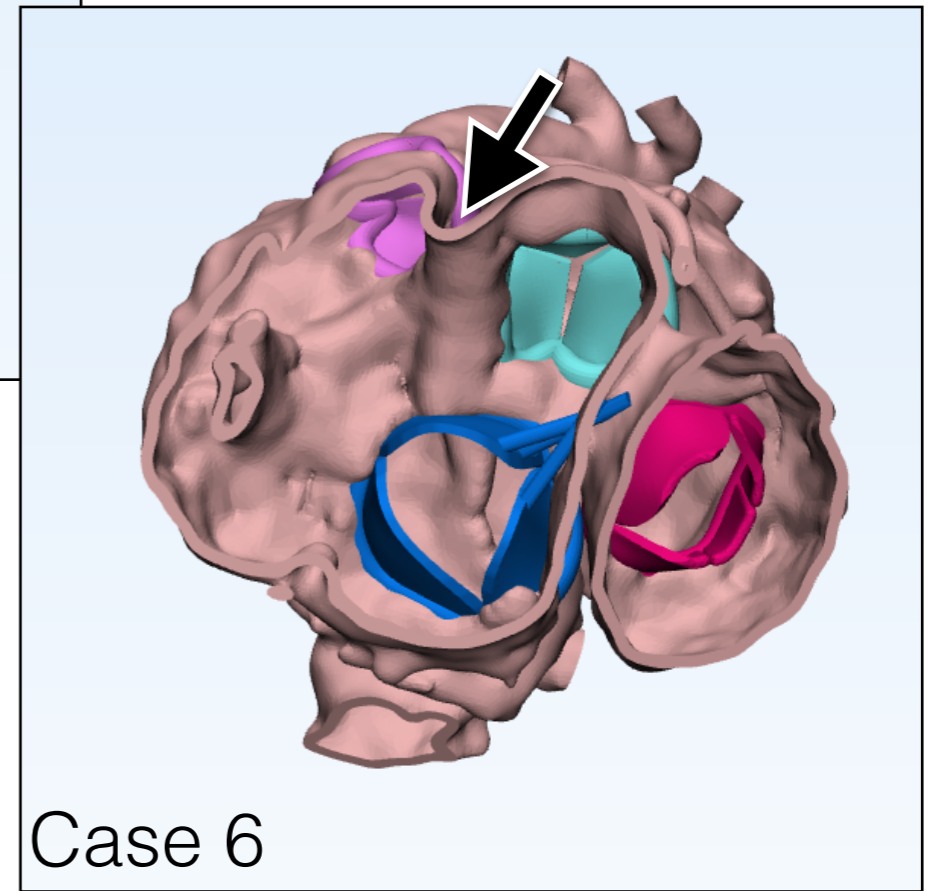
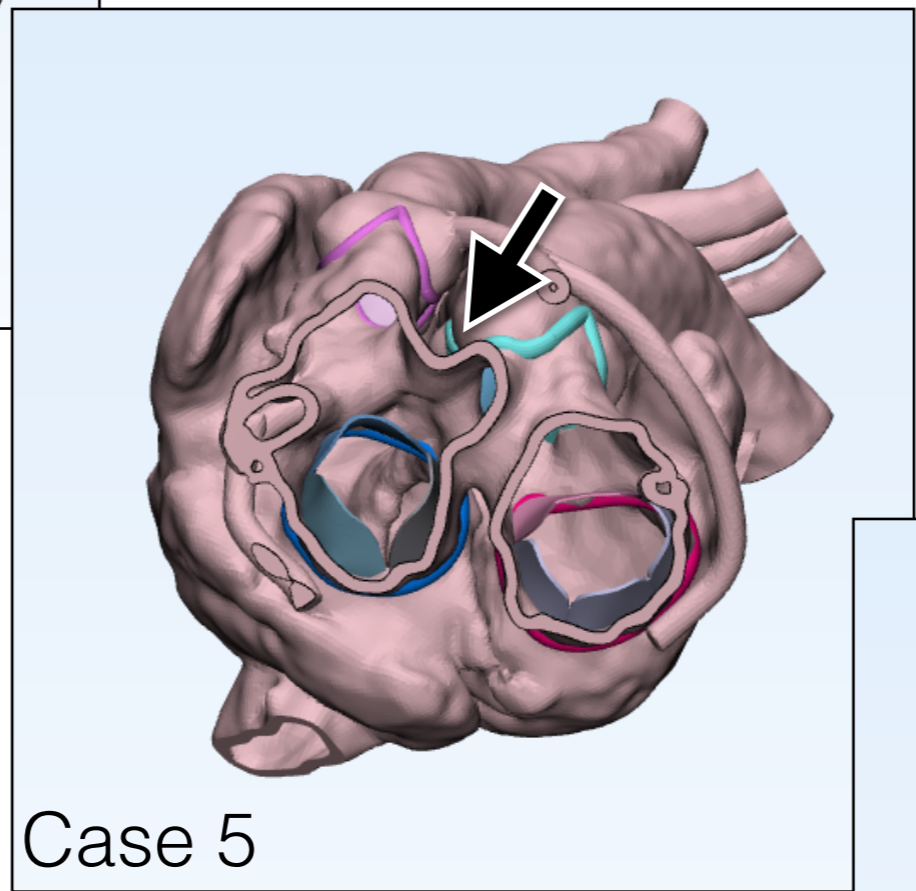
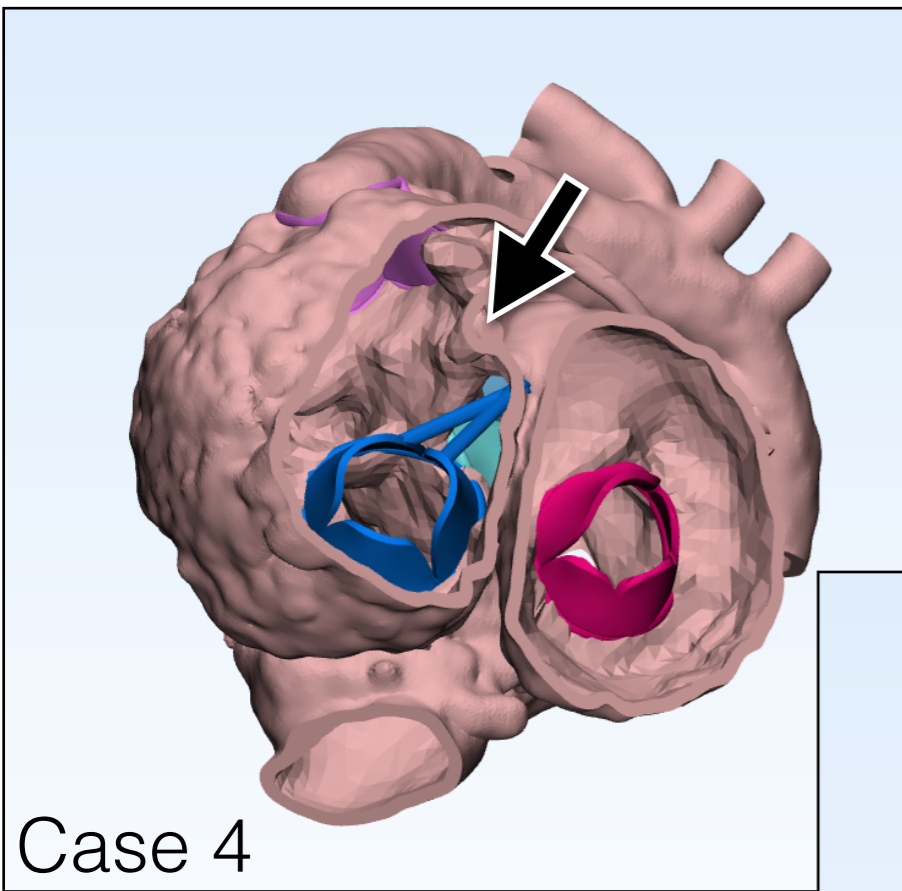


TGA

Taussig-Bing malformation

DORV

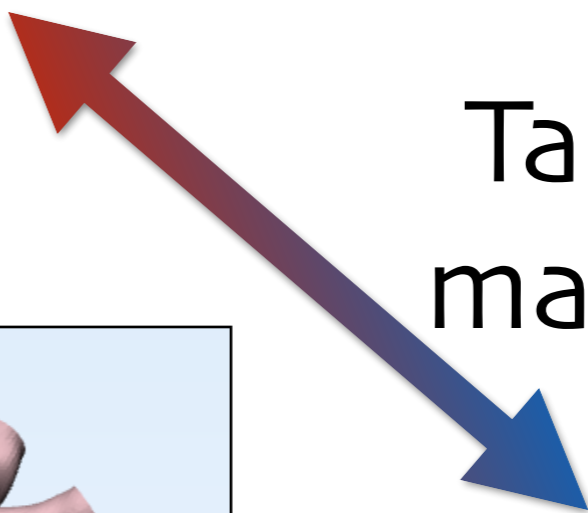
Anterior malalignment of outlet septum



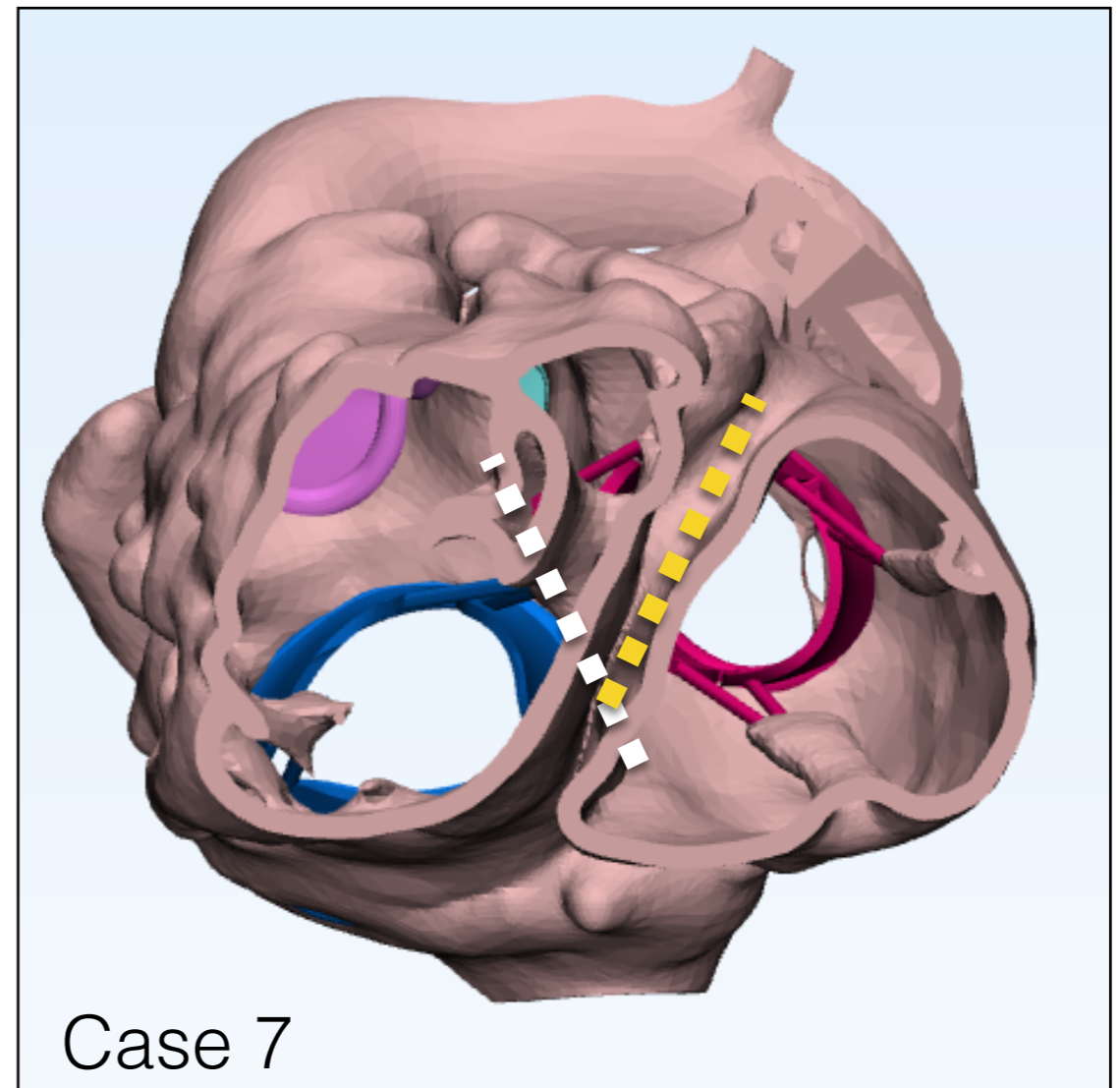
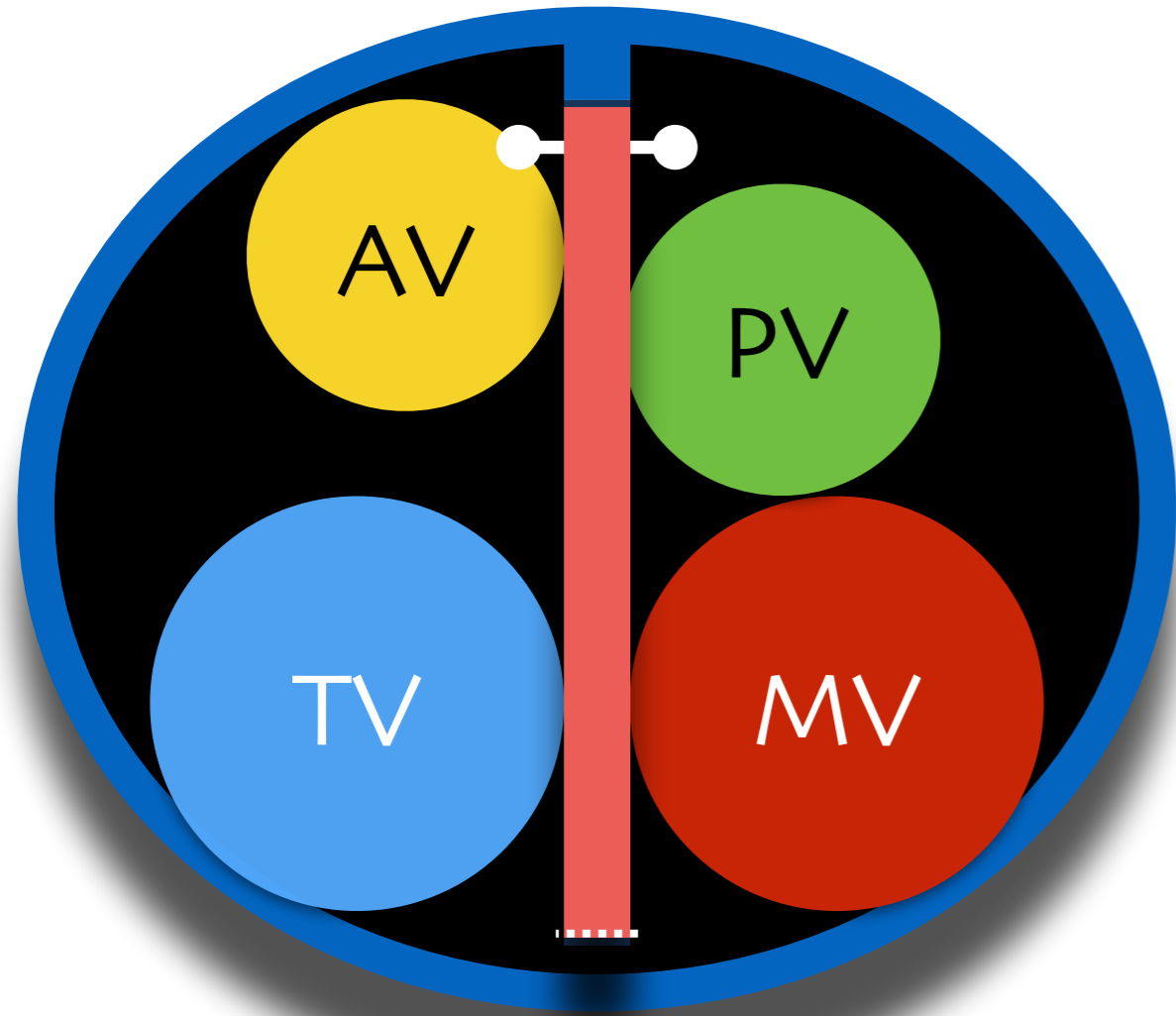
TGA

Taussig-Bing malformation

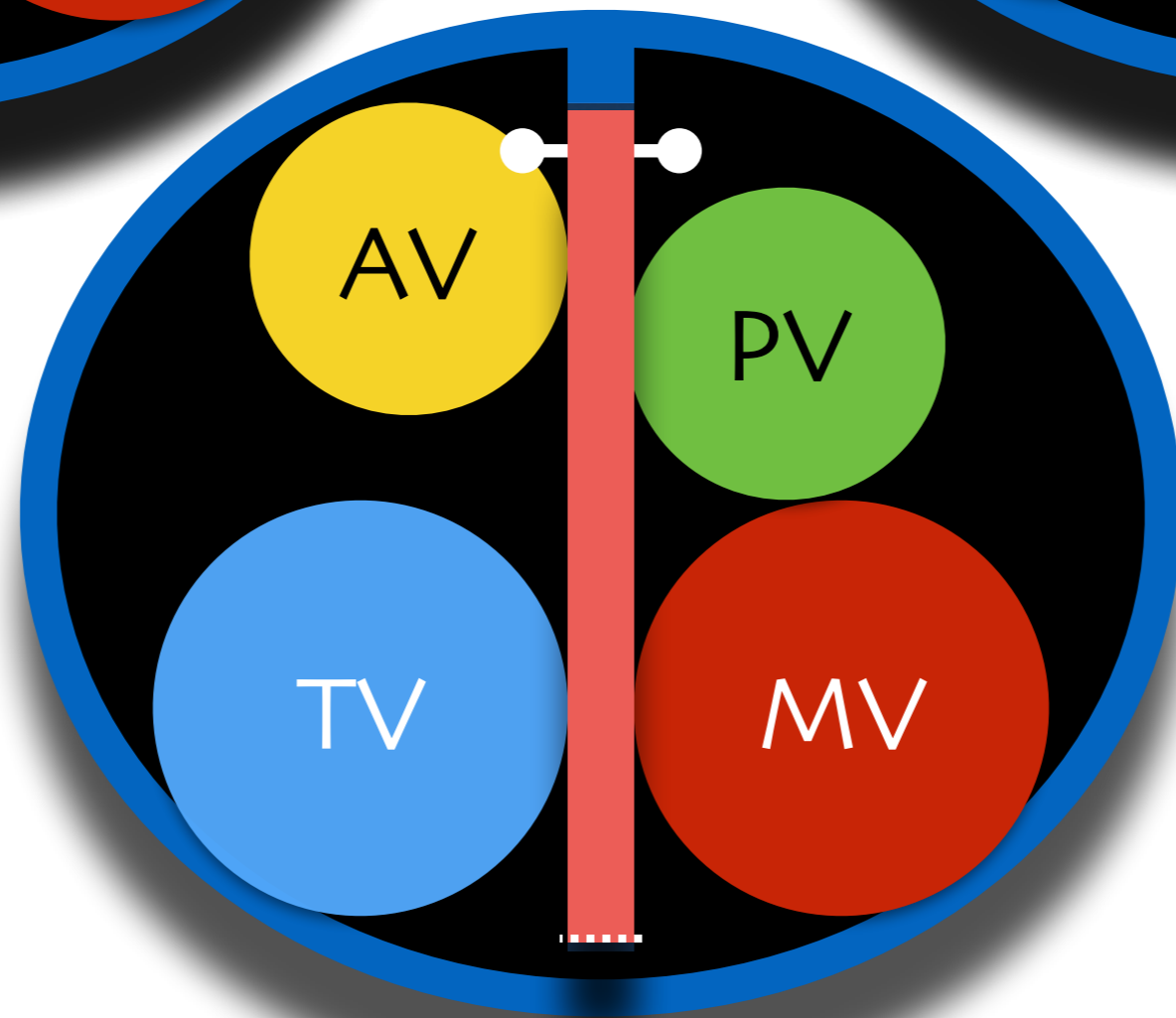
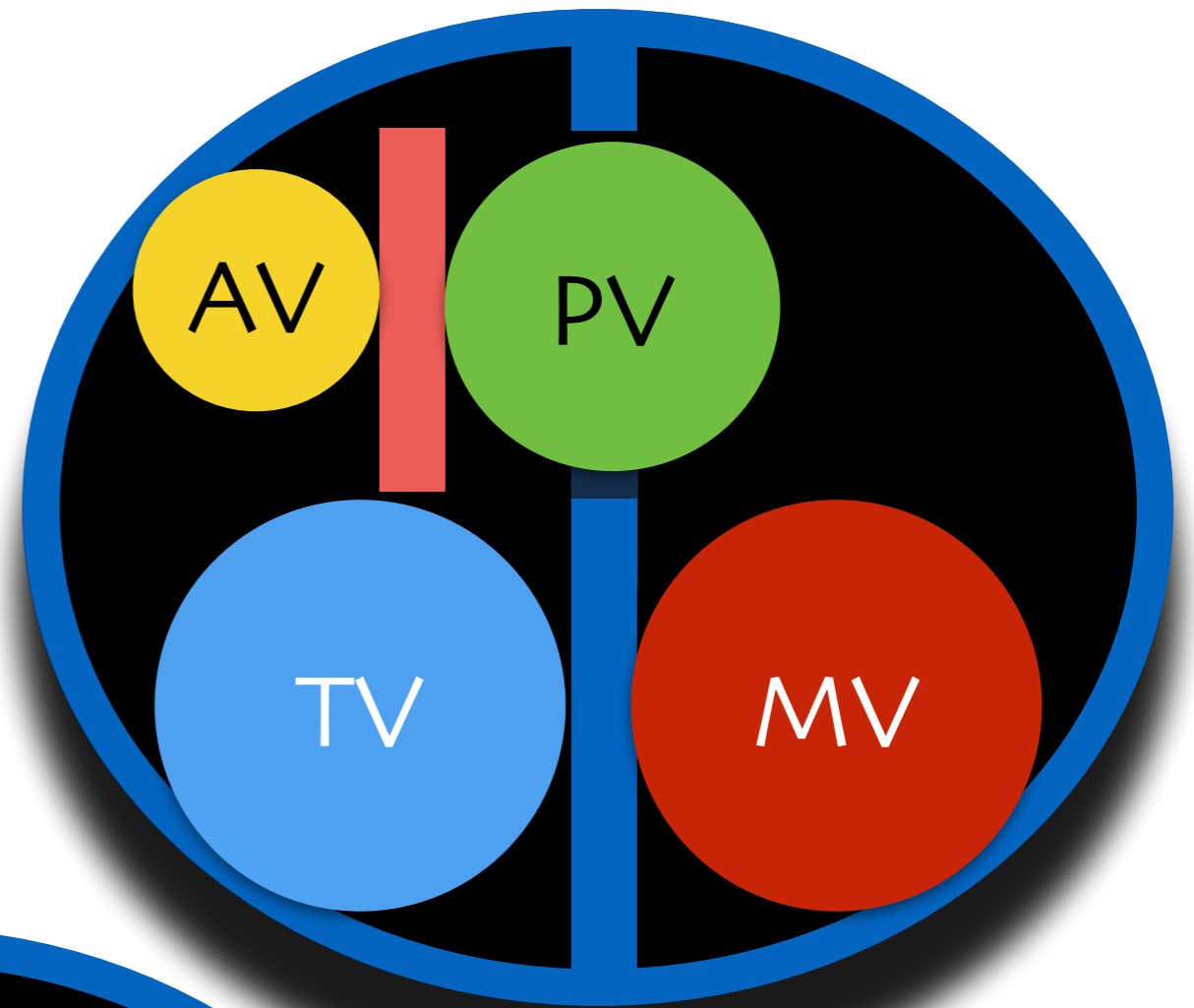
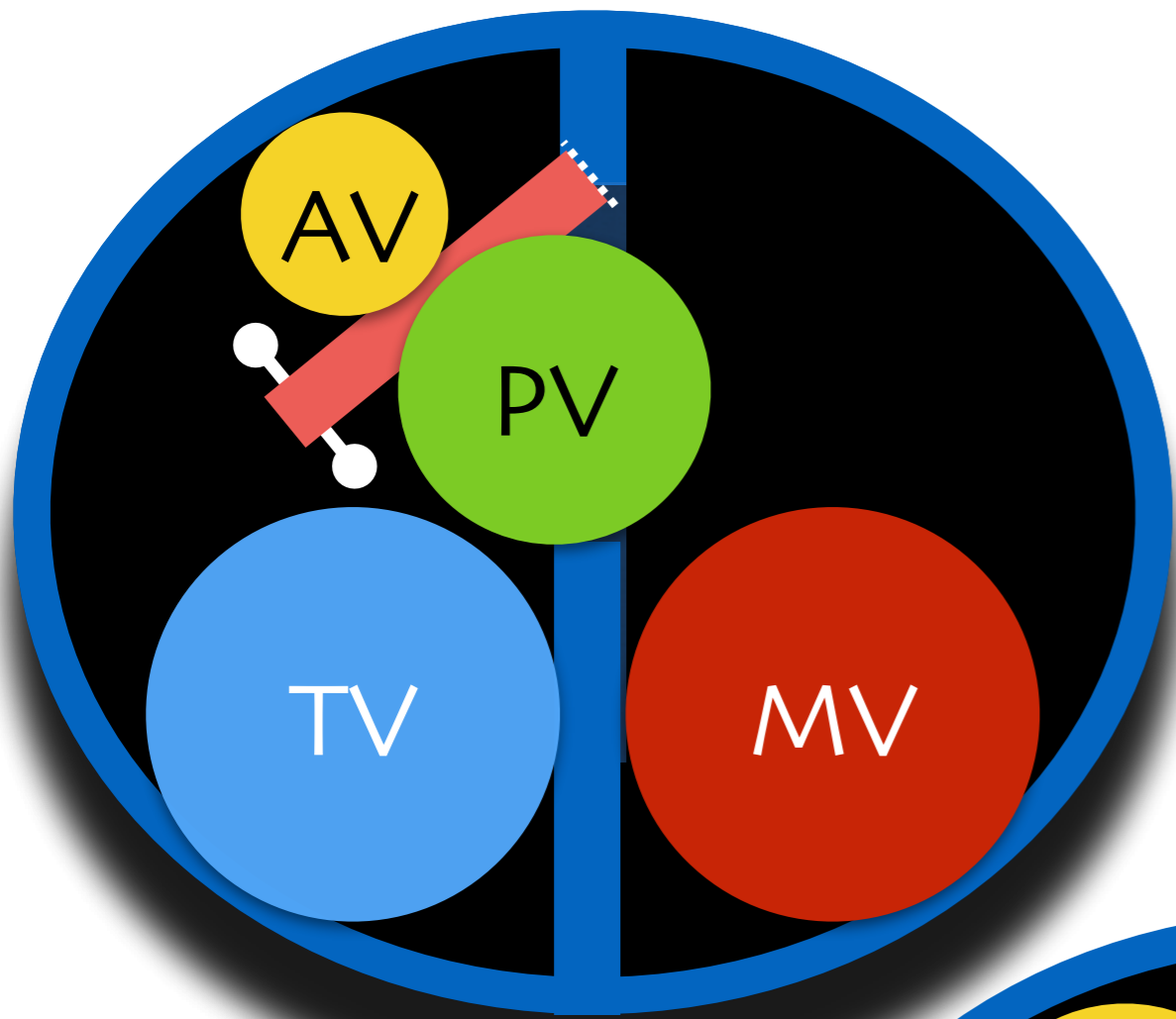
DORV



# TGA/DORV-Straddling mitral valve











TORONTO

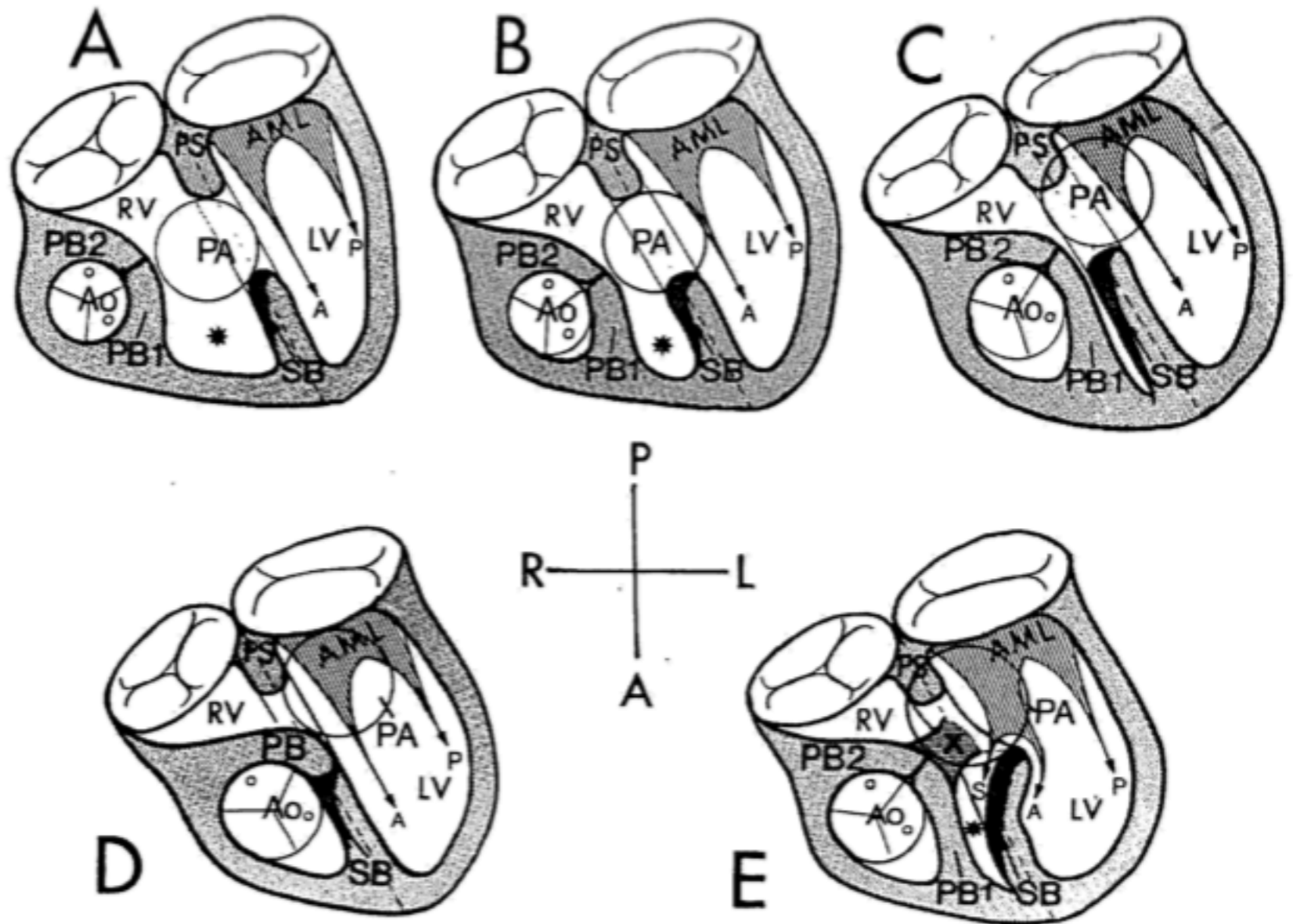
Thank you!



# Taussig-Bing anomaly with straddling mitral valve

Five patients with the left-sided or intermediate type (Le) have an associated straddling of the mitral valve. In four recognized preoperatively, and all four died postoperatively caused by the abnormal attachment of the anterior mitral leaflet. Retrospective study of angiographic clues of straddling mitral valve which enabled us to diagnose the diagnosis by cross-sectional echocardiography. A surgical abnormality is proposed which avoids operating upon yet the hemodynamic problem caused by the straddling successfully treated by the proposed operative method.

Alexander J. Muster, M.D., Saroja Bharati, M.D., Farouk S. Idriss, M.D., Milton H. Paul, M.D., Norman Arthur DeBoer, M.D., and Constantine Anagnostou



**Fig. 1.** Forms of Taussig-Bing heart. *A*, Right sided. *B*, Intermediate. *C*, Left sided. Note the characteristic subaortic arch consisting of first parietal band (*PB1*) and second parietal band (*PB2*). There is a space or pocket (\*) between *PB1* and the septal band (*SB*). *D*, In contrast, in transposition with subpulmonic ventricular septal defect, there is only one parietal band which merges with the *SB* to form the arch. *E*, In a variant of left-sided Taussig-Bing heart, an accessory muscle bundle "X" extends from the arch to the inferior margin of the ventricular septal defect, which becomes malaligned with the left ventricular inflow tract and may be a factor in causing straddling (*S*) of the anterior mitral leaflet (*AML*). Other abbreviations: *A* and *P*, Mitral attachments to anterior and posterior papillary muscles. *Ao*, Aorta. *LV*, Left ventricle. *PA*, Pulmonary artery. *PS*, Posterior ventricular septum. *RV*, Right ventricle.