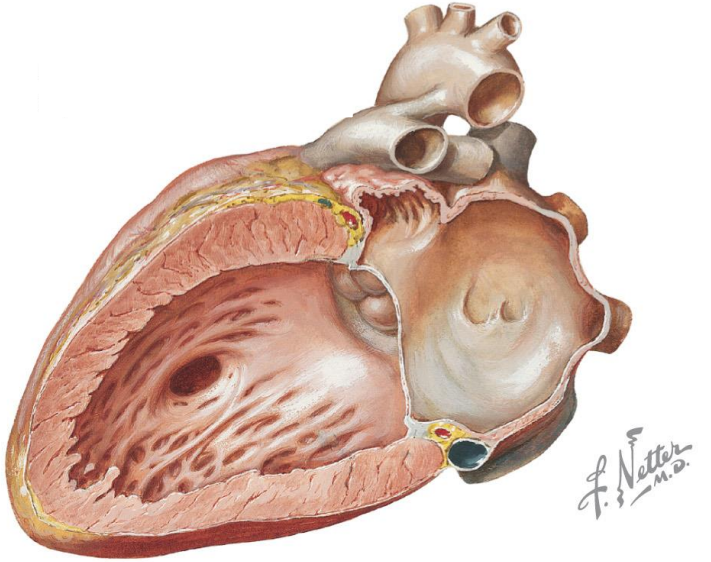

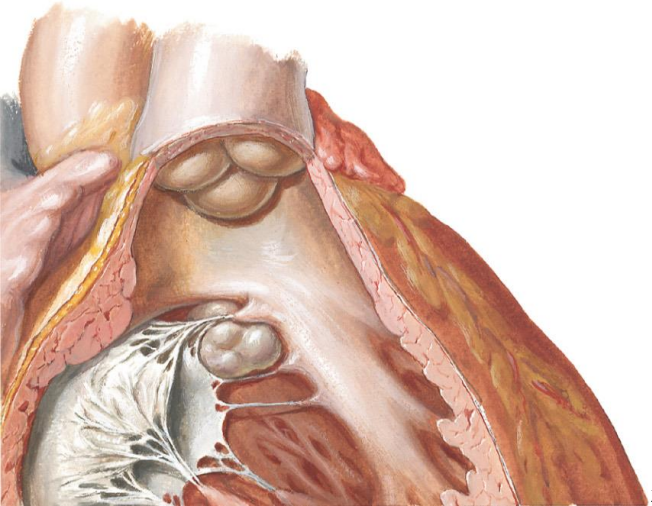

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6TH PEDIATRIC ECHOCARDIOGRAPHY SYMPOSIUM

SEPTEMBER 7TH 2024

Ventricular Septal Defects: Anatomy and Physiology

Charlie Simpkin, DO

Advanced Cardiac Imaging Fellow

Pulmonary Hypertension Fellow

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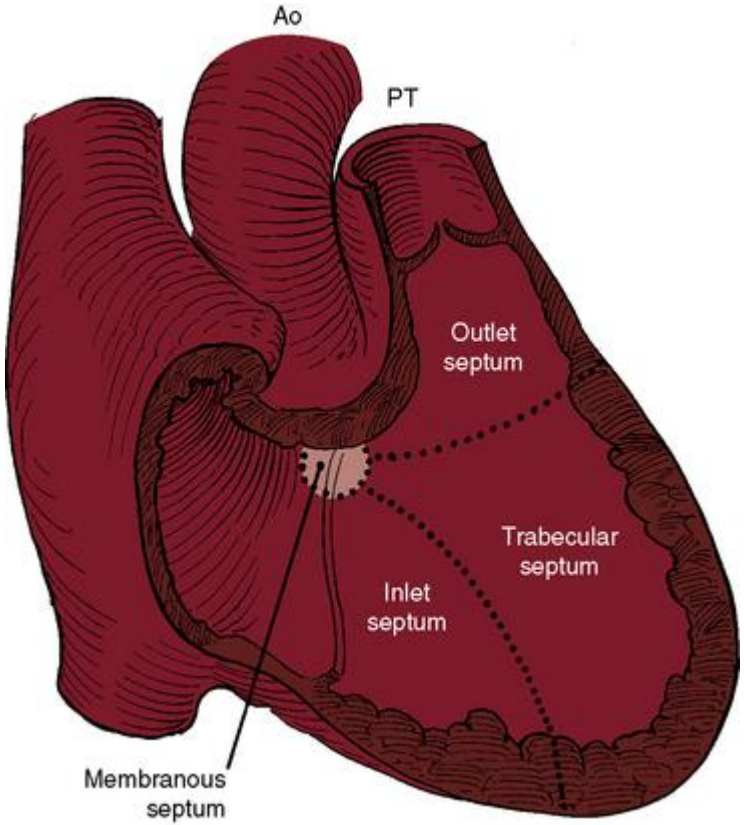
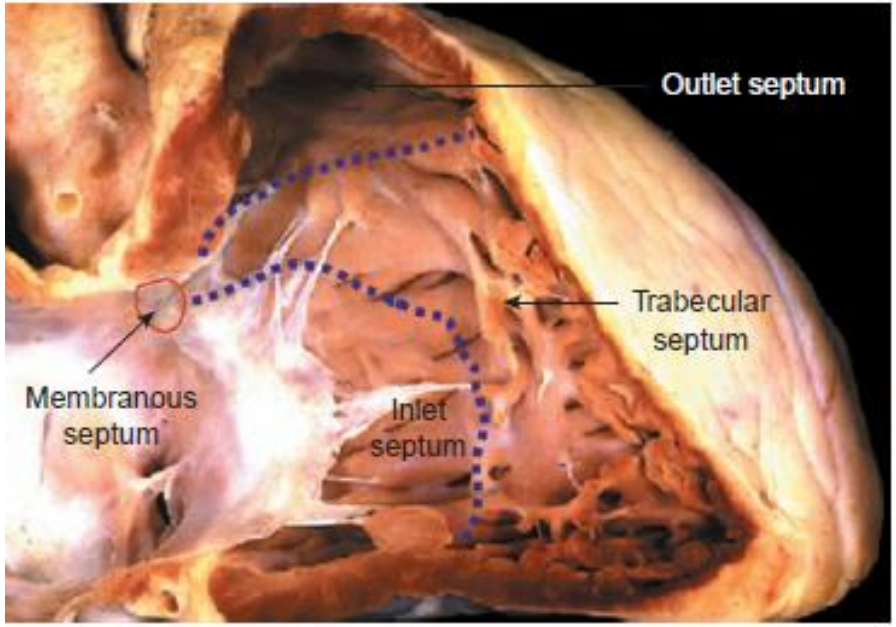
Disclosures:

- None

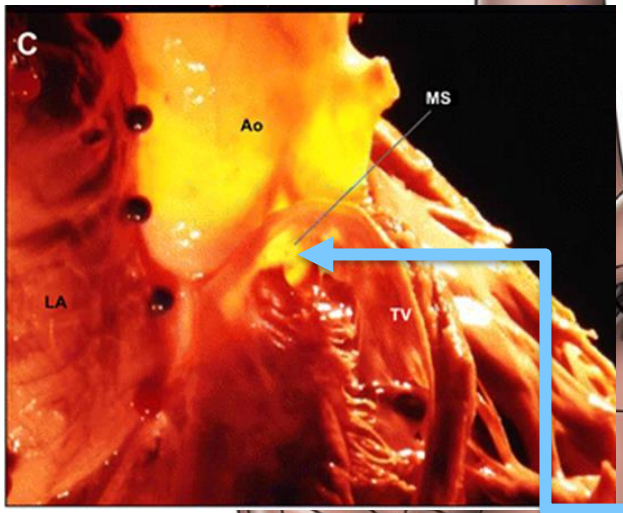




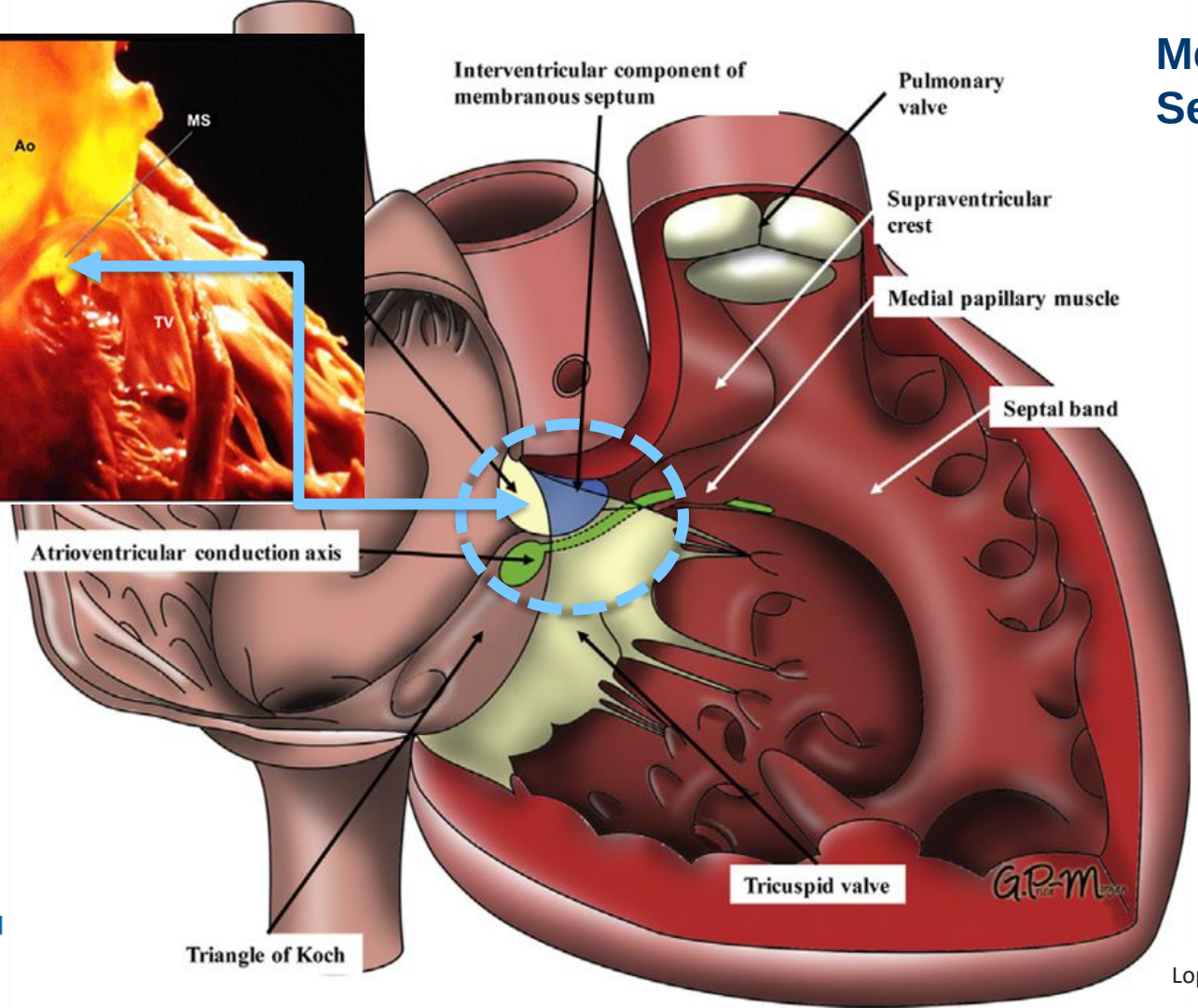
(Modified from Anderson RH, Becker AE, Lucchese FE, Meier MA, Rigby ML, Soto B. Morphology of congenital heart disease. Baltimore: University Park Press; 1983)

Forbus and Shirali 2009

Membranous Septum



Sharma et.al 2018.



Lopez L, et.al 2018.

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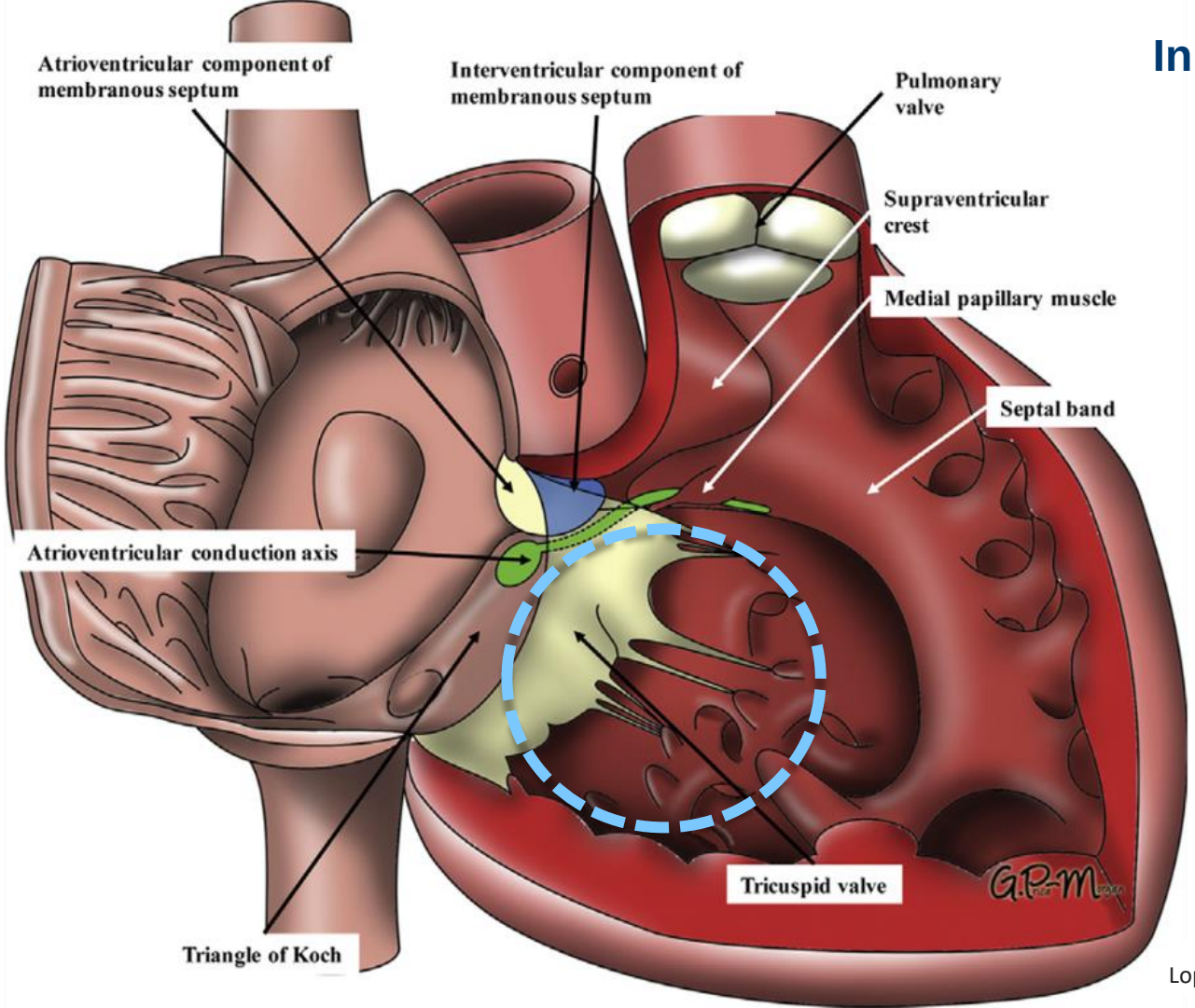
Inlet Septum



Sharma et.al 2018.

Lopez L, et.al 2018.

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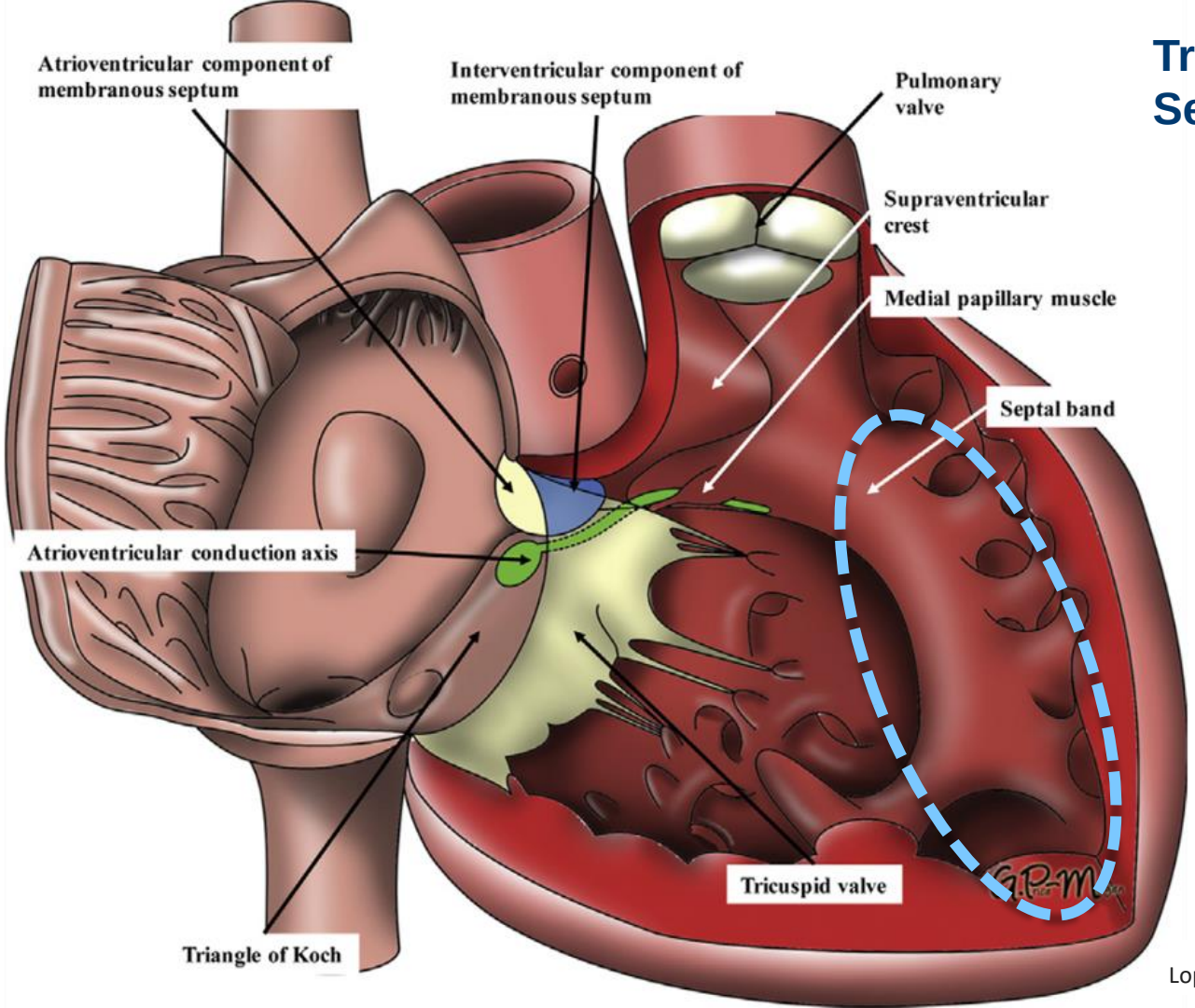
Trabecular Septum



Sharma et.al 2018.

Lopez L, et.al 2018.

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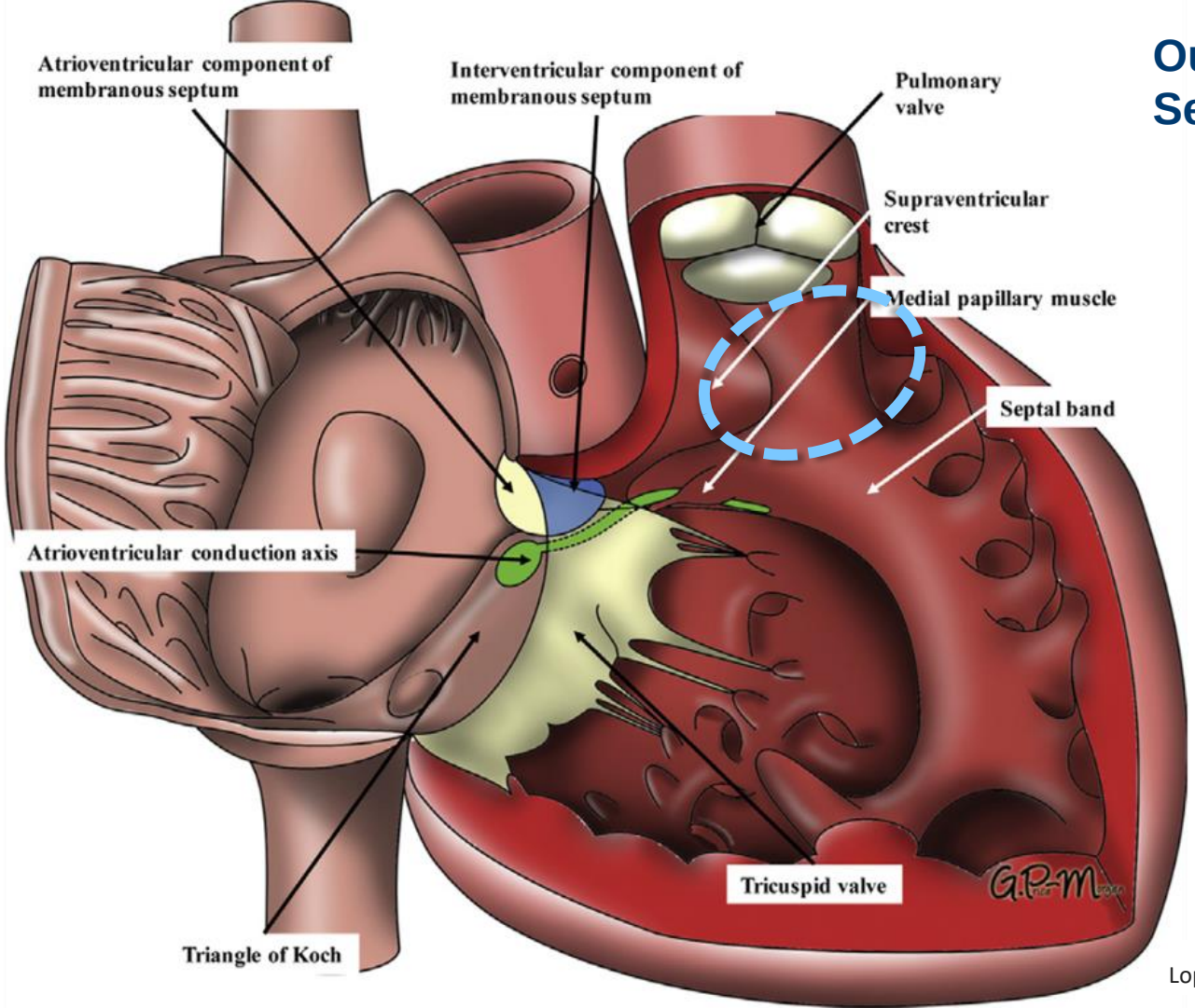
Outlet Septum



Sharma et.al 2018.

Lopez L, et.al 2018.

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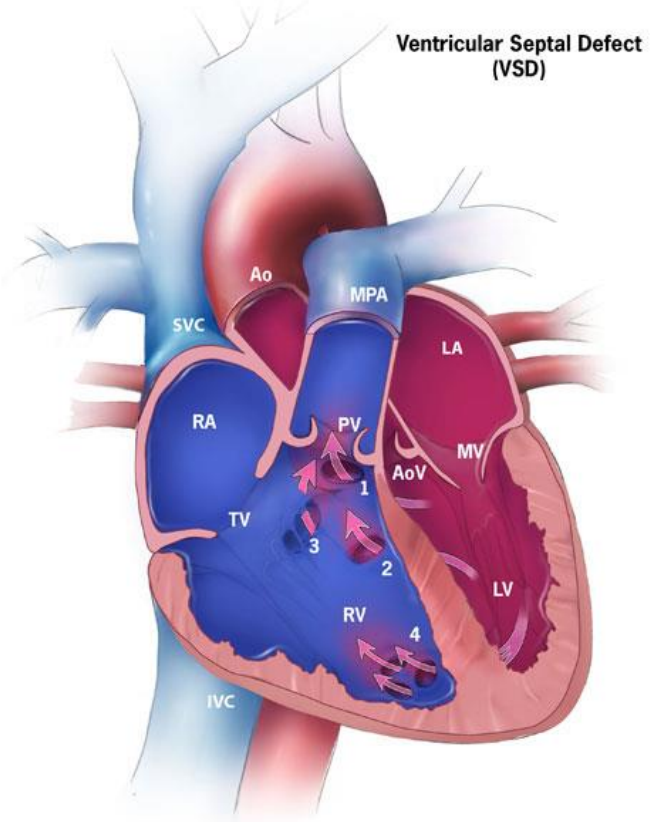
VSD Physiology

Blood Flows Down The Path Of Least Resistance



RA. Right Atrium
RV. Right Ventricle
LA. Left Atrium
LV. Left Ventricle

SVC. Superior Vena Cava
IVC. Inferior Vena Cava
MPA. Main Pulmonary Artery
Ao. Aorta

TV. Tricuspid Valve
MV. Mitral Valve
PV. Pulmonary Valve
AoV. Aortic Valve

1. Conoventricular, malaligned
2. perimembranous
3. inlet
4. muscular

https://www.cdc.gov/ncbddd/heartdefects/ventricularseptaldefect.html

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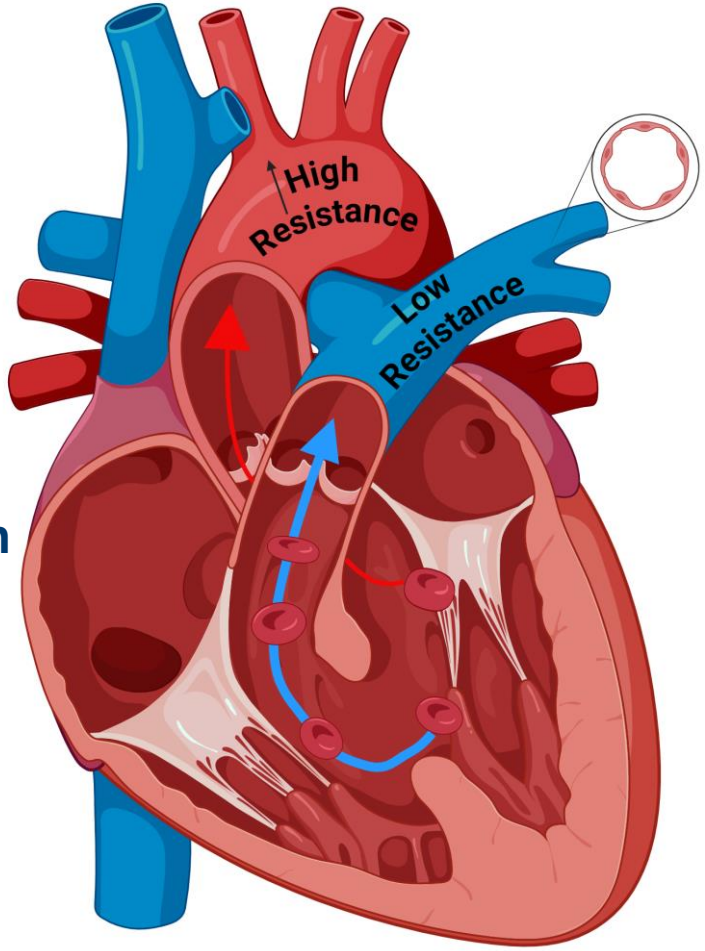
VSD Physiology

Typical Course:

- As PVR falls: L -> R Shunting
- ↑ Pulmonary blood flow
- Volume loads LA and LV
- Stimulates catecholamine response to maintain cardiac output to systemic circulation
- Congestive heart failure develops ~3-4 months of life

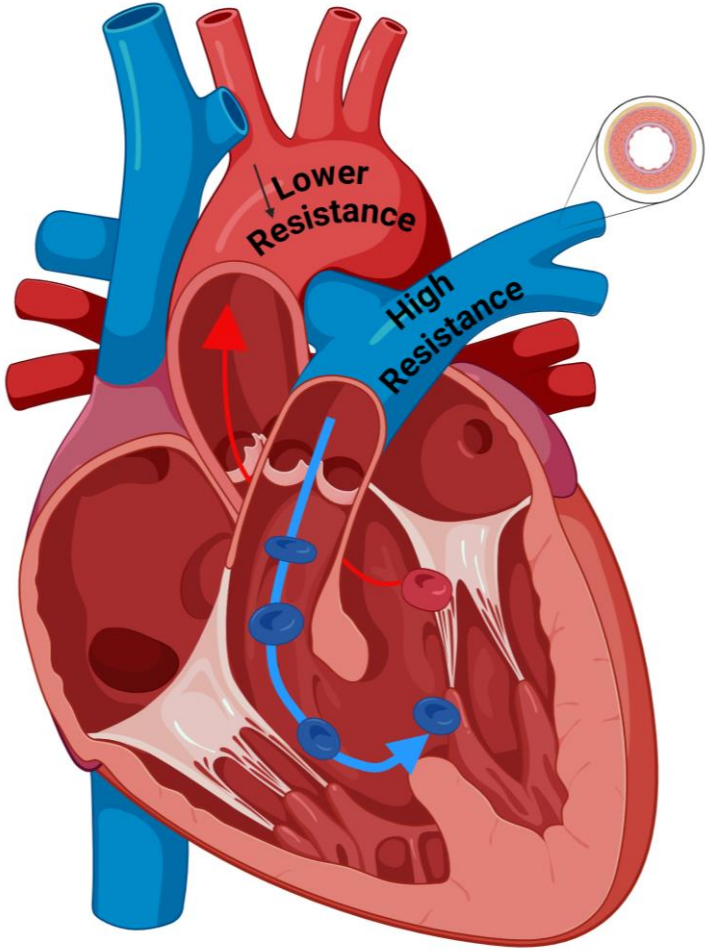


VSD Physiology

Left untreated:

- **Pulmonary vascular remodeling**
- **Reversal of shunt R -> L**
- **“Eisenmenger Physiology”**

Depending on the child, ideal age for repair is 4-6mo of life



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Defects

Classification of Ventricular Septal Defects for the Eleventh Iteration of the International Classification of Diseases—Striving for Consensus: A Report From the International Society for Nomenclature of Paediatric and Congenital Heart Disease

Presented at the Seventh World Congress of Paediatric Cardiology and Cardiac Surgery, Barcelona, Spain, July 16–21, 2017.

Leo Lopez, MD[a,**], Lucile Houyel, MD[b], Steven D. Colan, MD[c], Robert H. Anderson, MD, PhD (Hon)[d], Marie J. Béland, MDCM[e], Vera D. Aiello, MD, PhD[f], Frederique Bailliard, MD, MS[g], Meryl S. Cohen, MD[h], Jeffrey P. Jacobs, MD[i], Hiromi Kurosawa, MD[j], Stephen P. Sanders, MD[c], Henry L. Walters III, MD[k], Paul M. Weinberg, MD[h], Jeffrey R. Boris, MD[h], Andrew C. Cook, PhD[l], Adrian Crucean, MD, PhD[m], Allen D. Everett, MD[n], J. William Gaynor, MD[h], Jorge Giroud, MD[i], Kristine J. Guleserian, MD[a], Marina L. Hughes, DPhil, FRACP[o], Amy L. Juraszek, MD[p], Otto N. Krogmann, MD[q], Bohdan J. Maruszewski, MD, PhD[r], James D. St. Louis, MD[s], Stephen P. Seslar, MD, PhD[t], Diane E. Spicer, BS, PA[u], Shubhika Srivastava, MBBS[v], Giovanni Stellin, MD[w], Christo I. Tchervenkov, MD[x], Lianyi Wang, MD[y], Rodney C.G. Franklin, MD[z]

Table 1. International Society for Nomenclature of Paediatric and Congenital Heart Disease Classification Scheme for Ventricular Septal Defect (International Paediatric and Congenital Cardiac Code 07.10.00) as Incorporated in the International Classification of Diseases-11th Iteration

1. Perimembranous central VSD (07.10.01)
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    a. Inlet perimembranous VSD without AV septal malalignment and without a common AV junction (07.10.02)
    b. Inlet perimembranous VSD with AV septal malalignment and without a common AV junction (07.14.06)
    c. Inlet muscular VSD (07.11.02)
3. Trabecular muscular VSD (07.11.01)
    a. Trabecular muscular VSD: midseptal (07.11.04)
    b. Trabecular muscular VSD: apical (07.11.03)
    c. Trabecular muscular VSD: postero-inferior (07.11.12)
    d. Trabecular muscular VSD: anterosuperior (07.11.07)
    e. Trabecular muscular VSD: multiple ("Swiss cheese" septum) (07.11.05)
4. Outlet VSD (07.12.00)
    a. Outlet VSD without malalignment (07.12.09)
        i. Outlet muscular VSD without malalignment (07.11.06)
        ii. Doubly committed juxta-arterial VSD without malalignment (07.12.01)
            1. Doubly committed juxta-arterial VSD without malalignment and with a muscular postero-inferior rim (07.12.02)
            2. Doubly committed juxta-arterial VSD without malalignment and with a fibrous postero-inferior rim (perimembranous extension) (07.12.03)
    b. Outlet VSD with anteriorly malaligned outlet septum (07.10.17)
        i. Outlet muscular VSD with anteriorly malaligned outlet septum (07.11.15)
        ii. Outlet perimembranous VSD with anteriorly malaligned outlet septum (07.10.04)
        iii. Doubly committed juxta-arterial VSD with anteriorly malaligned fibrous outlet septum (07.12.12)
            1. Doubly committed juxta-arterial VSD with anteriorly malaligned fibrous outlet septum and a muscular postero-inferior rim (07.12.07)
            2. Doubly committed juxta-arterial VSD with anteriorly malaligned fibrous outlet septum and a fibrous postero-inferior rim (perimembranous extension) (07.12.05)
    c. Outlet VSD with posteriorly malaligned outlet septum (07.10.18)
        i. Outlet muscular VSD with posteriorly malaligned outlet septum (07.11.16)
        ii. Outlet perimembranous VSD with posteriorly malaligned outlet septum (07.10.19)
        iii. Doubly committed juxta-arterial VSD with posteriorly malaligned fibrous outlet septum (07.12.13)
            1. Doubly committed juxta-arterial VSD with posteriorly malaligned fibrous outlet septum and a muscular postero-inferior rim (07.12.08)
            2. Doubly committed juxta-arterial VSD with posteriorly malaligned fibrous outlet septum and a fibrous postero-inferior rim (perimembranous extension) (07.12.06)

Defects are named based on:

Their geographic location

And

Their margins (borders)

Central Perimembranous

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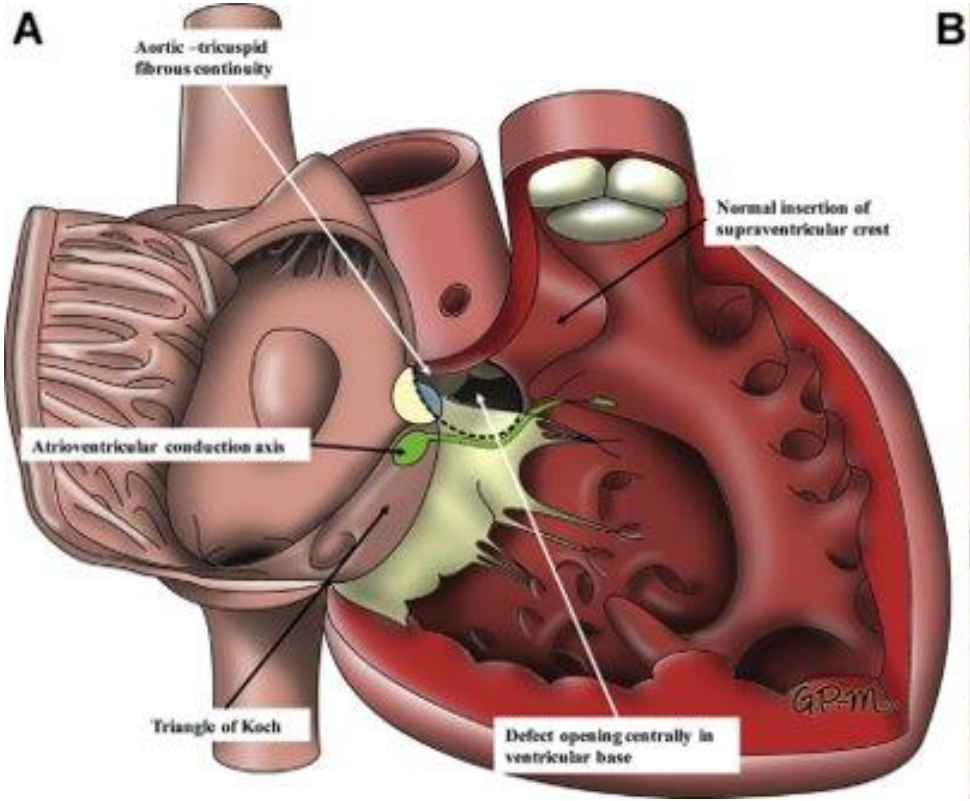
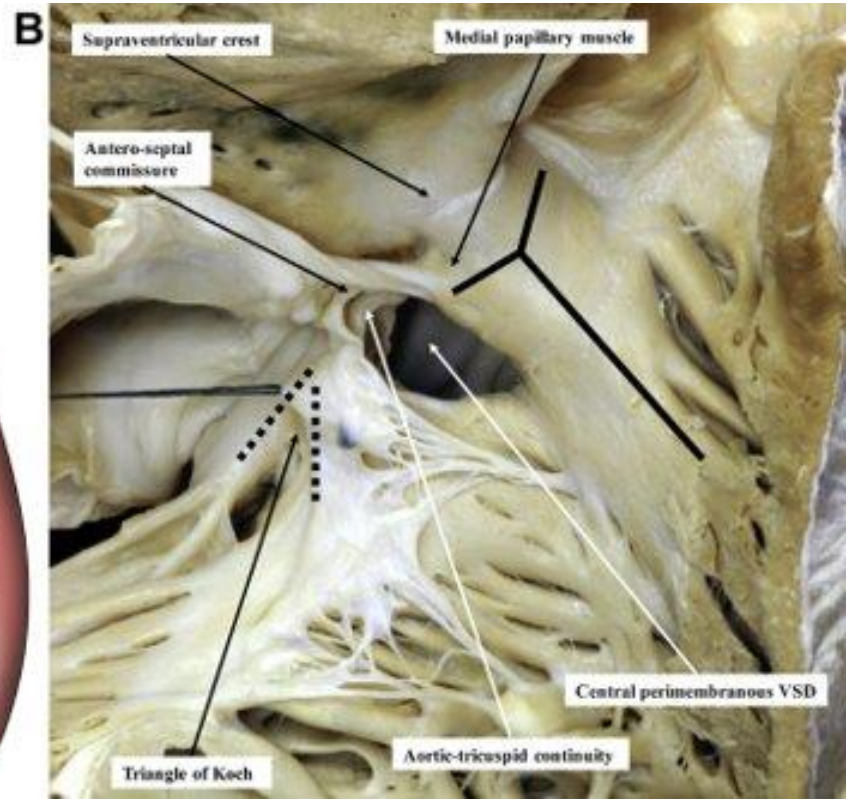
      i. Outlet muscular VSD with posteriorly malaligned outlet septum (07.11.16)
      ii. Outlet perimembranous VSD with posteriorly malaligned outlet septum (07.10.19)
      iii. Doubly committed juxta-arterial VSD with posteriorly malaligned fibrous outlet septum (07.12.13)
         1. Doubly committed juxta-arterial VSD with posteriorly malaligned fibrous outlet septum and a muscular postero-inferior rim (07.12.08)
         2. Doubly committed juxta-arterial VSD with posteriorly malaligned fibrous outlet septum and a fibrous postero-inferior rim (perimembranous extension) (07.12.06)





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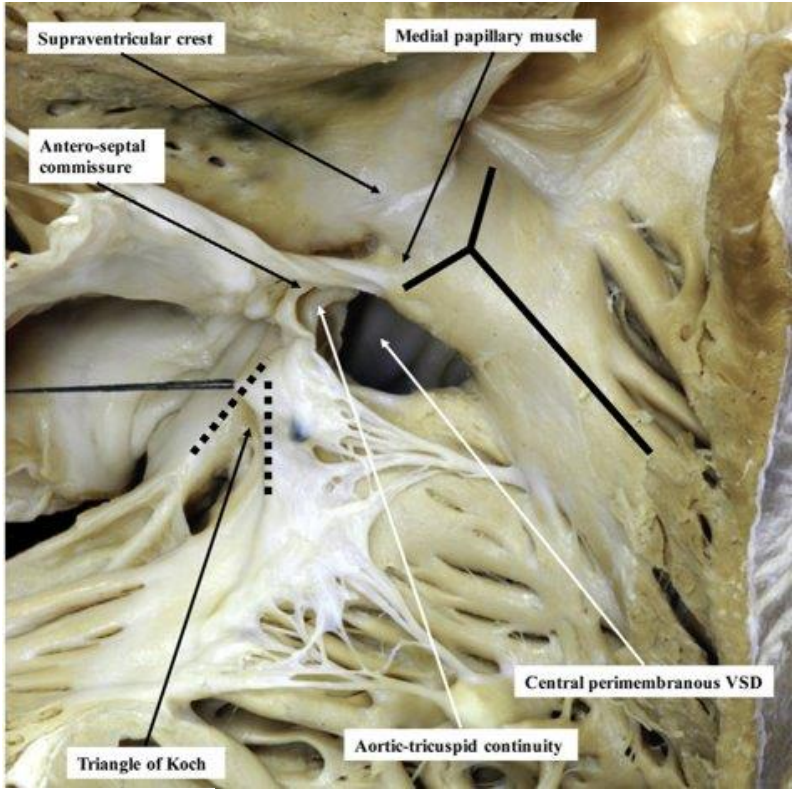
Central Perimembranous

- Location
  - Opens in Center of interventricular part of membranous septum
  - Behind the septal leaflet of tricuspid valve
  - Below right/non coronary cusps of aortic valve
  - Below postero-inferior limb of septal band (Y) and medial papillary muscle
- Fibrous Continuity between TV and AoV



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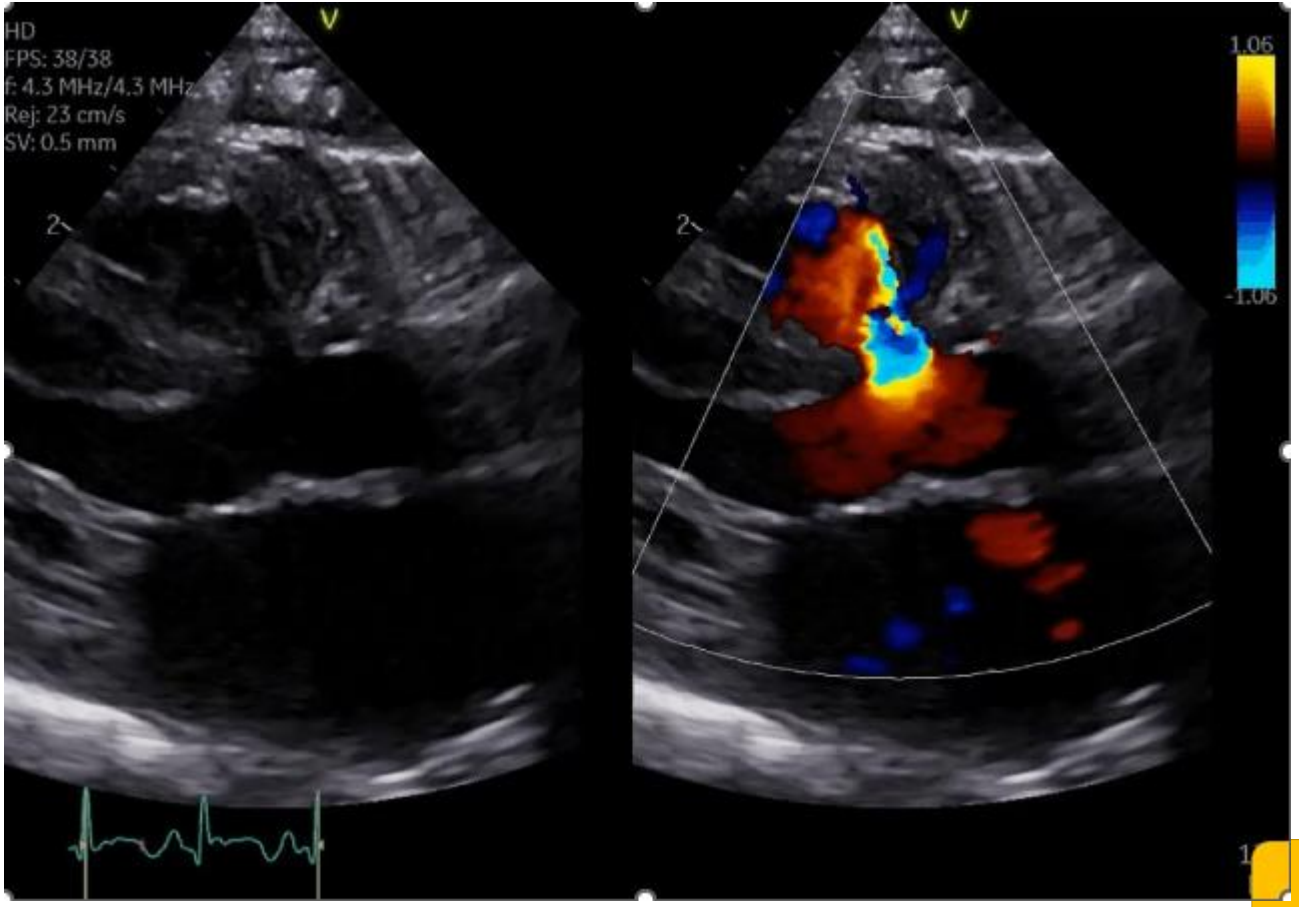
Central Perimembranous



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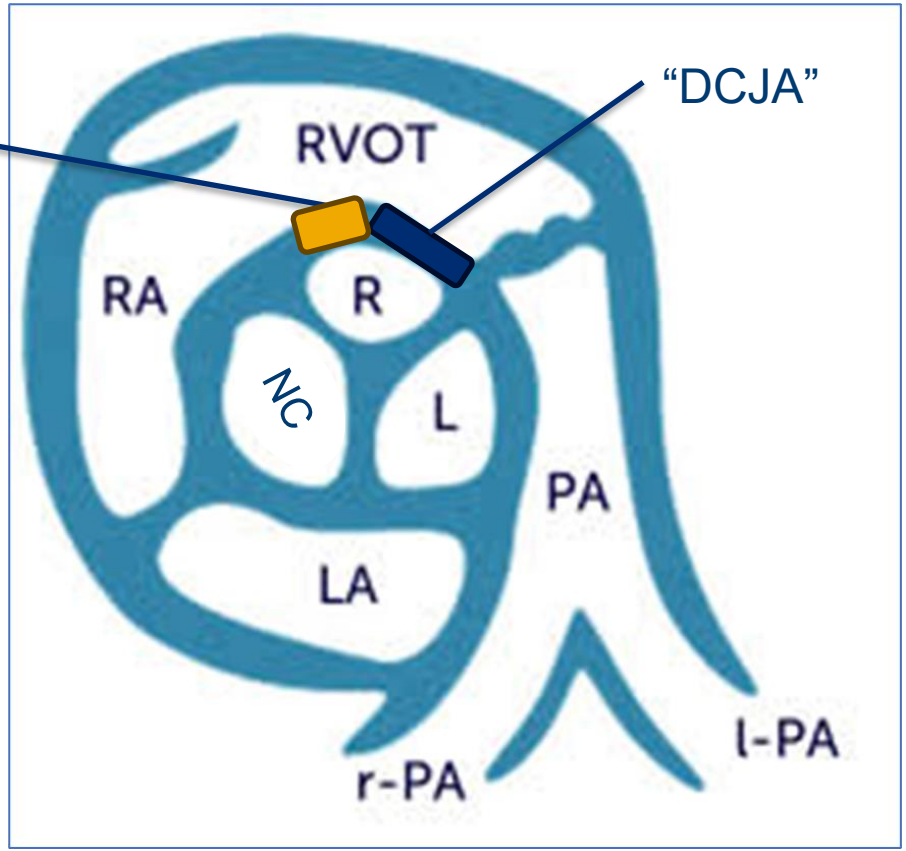
Central Perimembranous

Central
Perimembranous



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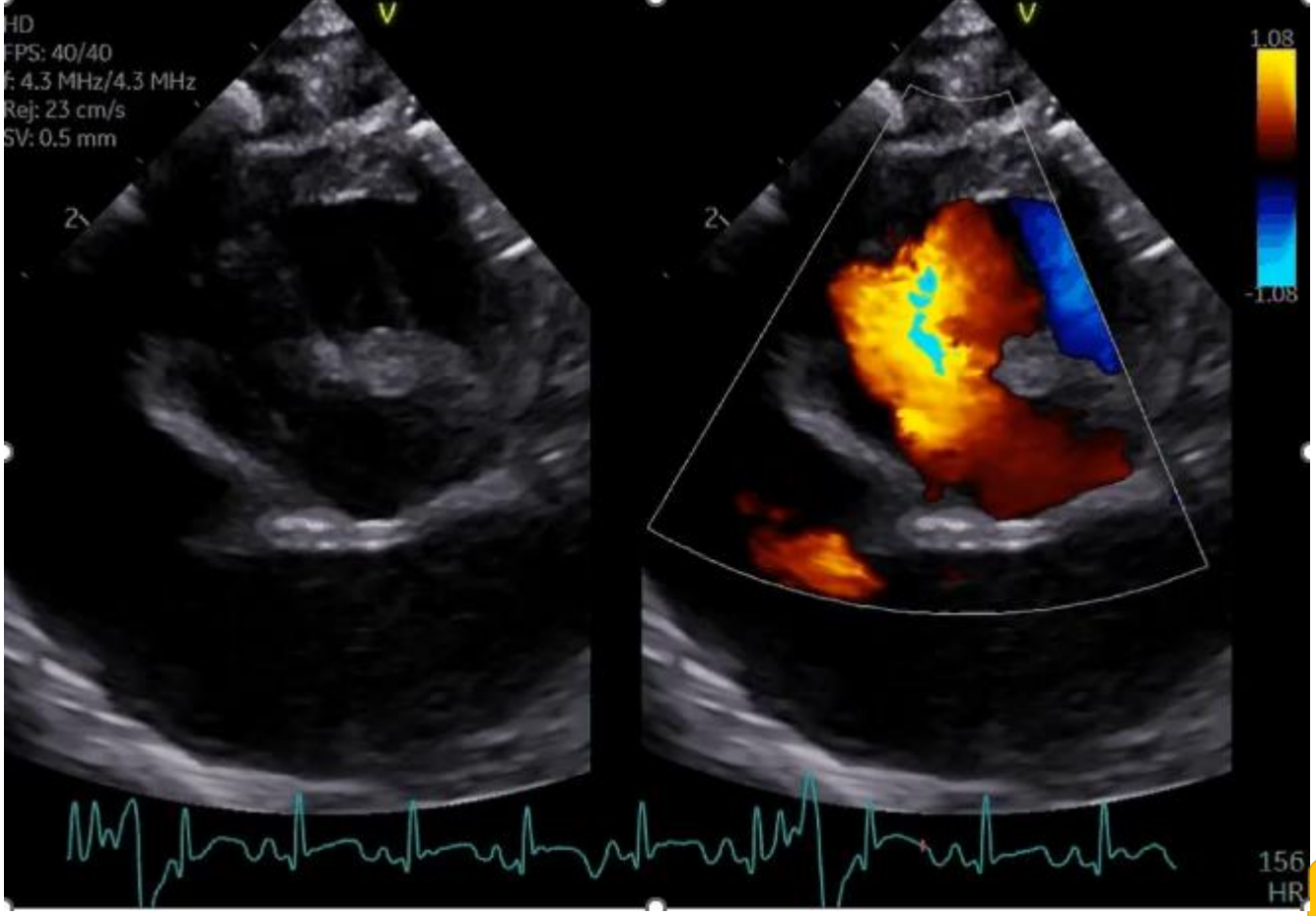

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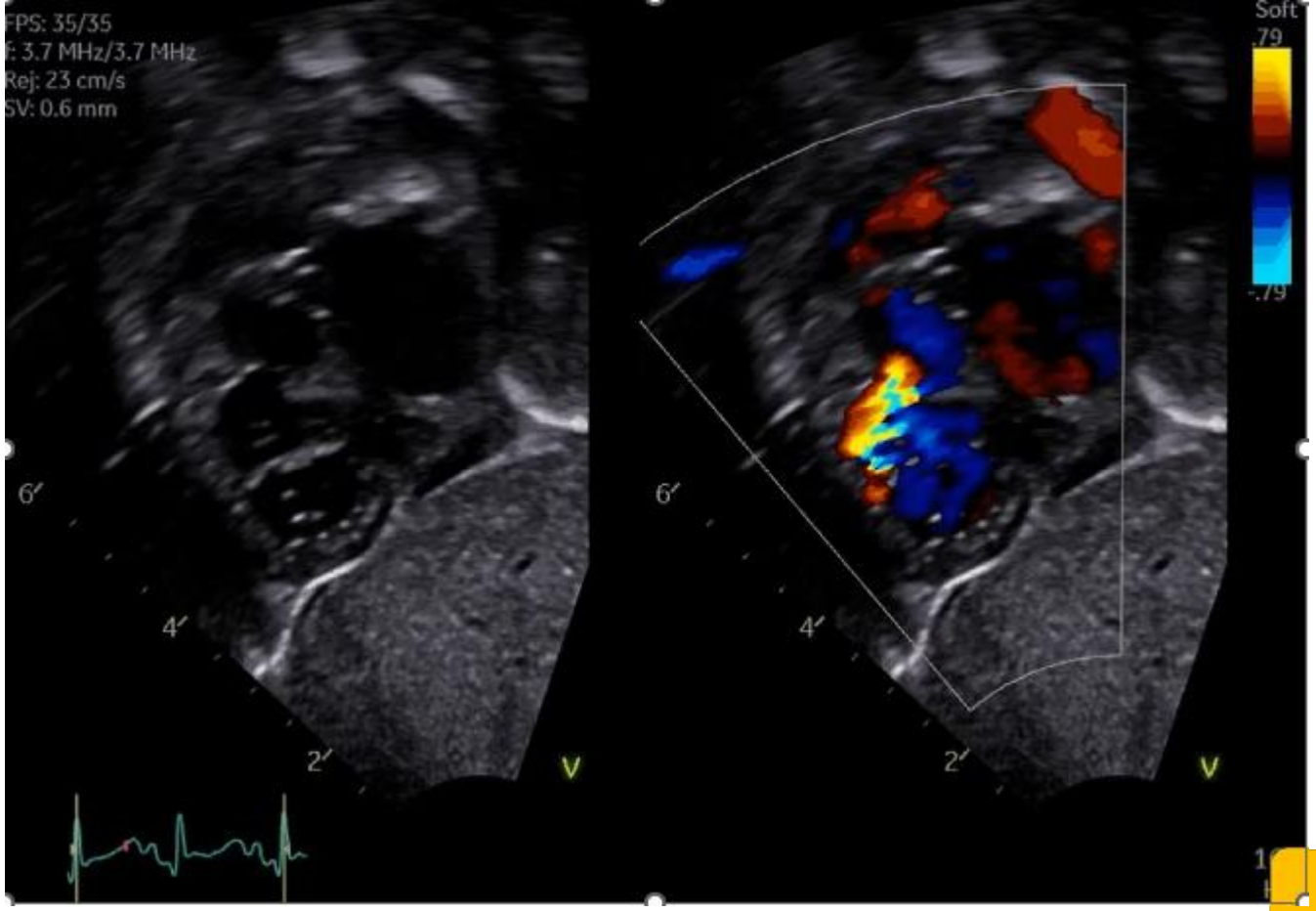
Central Perimembranous



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Central
Perimembranous

Inlet

= AVSD*

*There is a SUPER rare occurrence where an Inlet VSD is present with straddling TV but NOT in association with an AVSD

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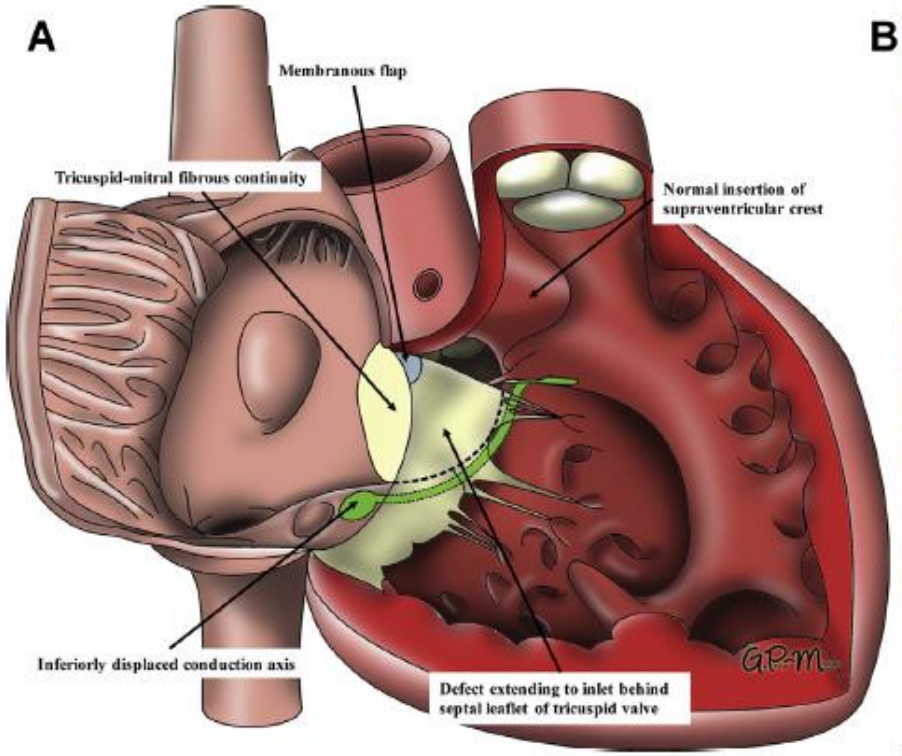

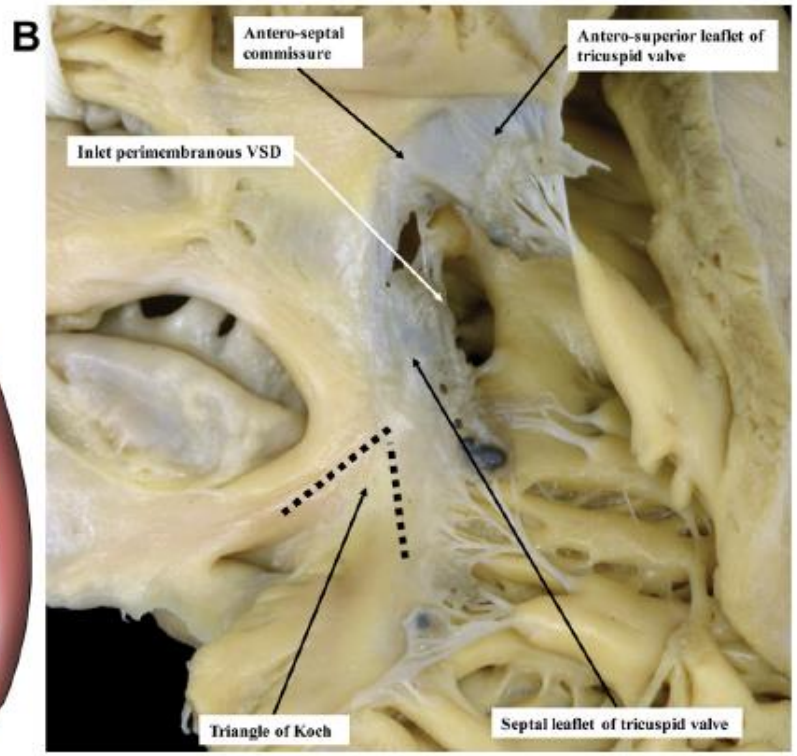

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Inlet Perimembranous

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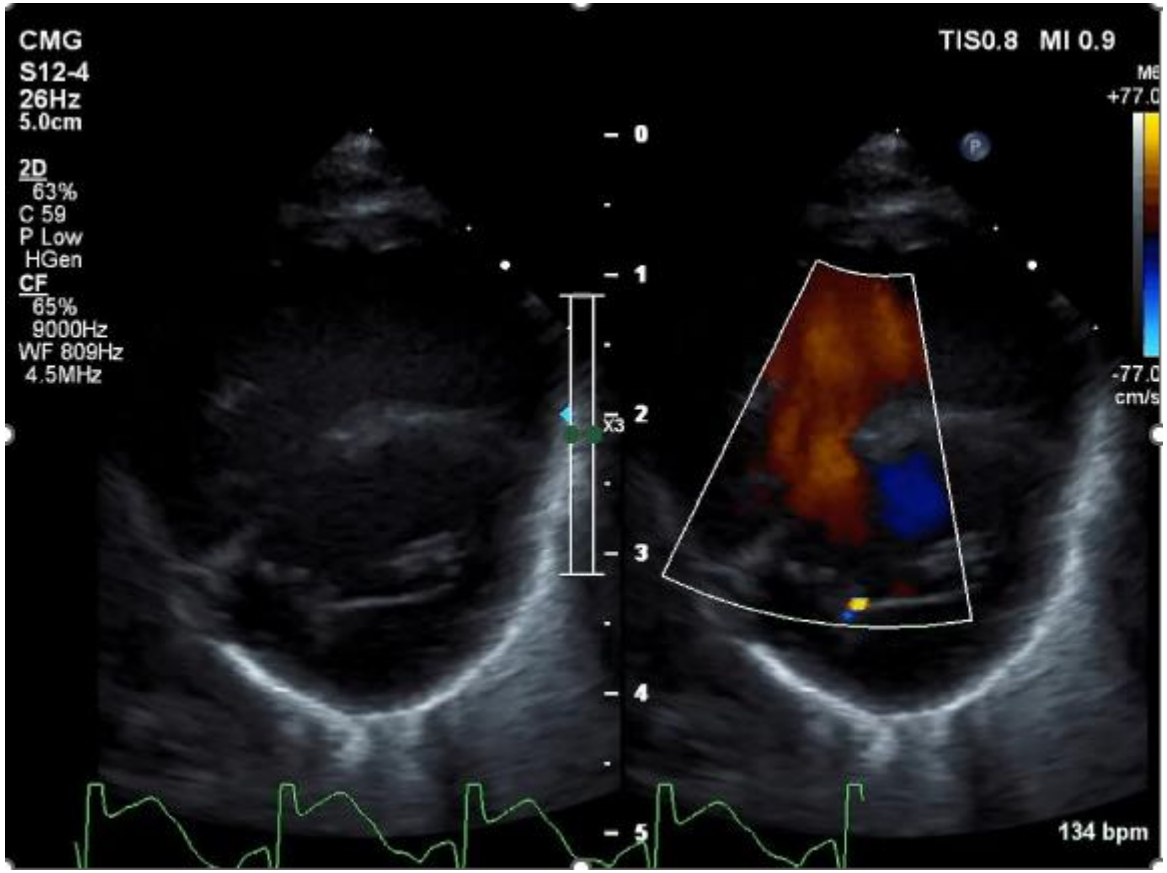
Inlet
Perimembranous



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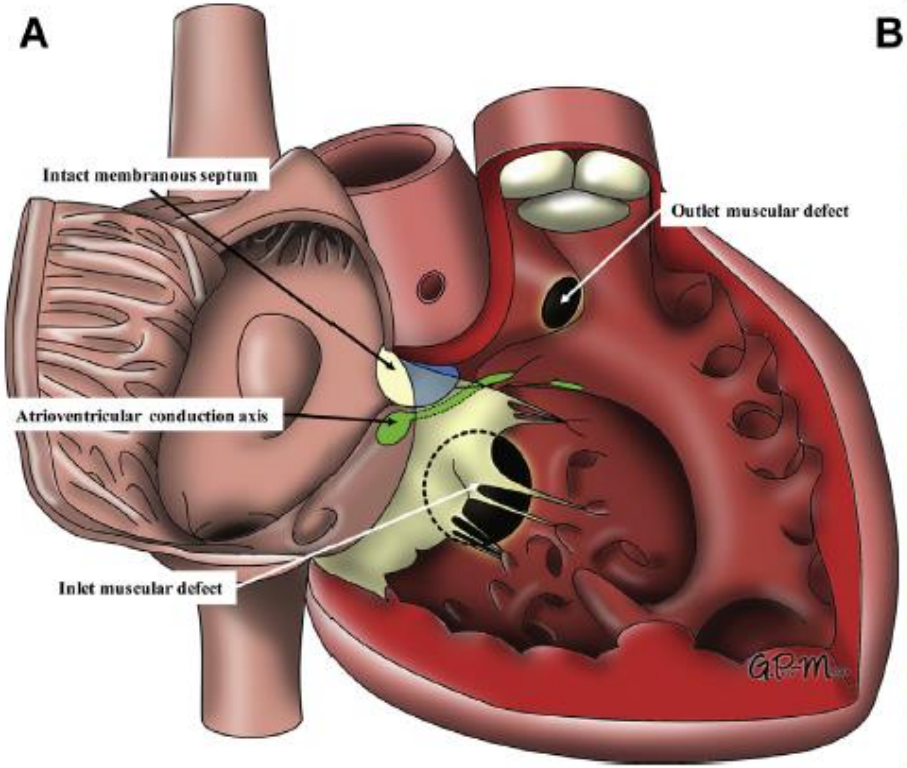
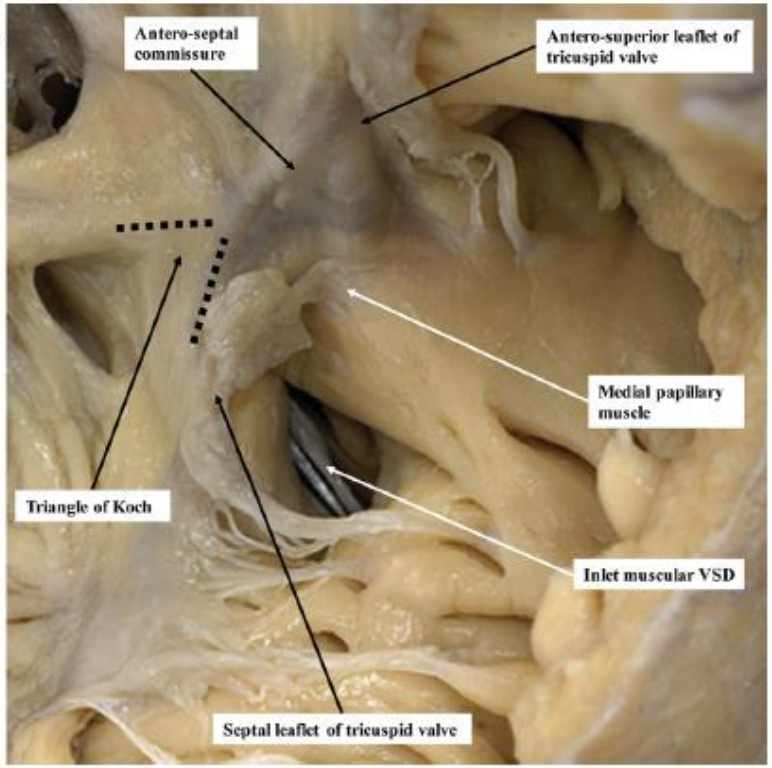
Inlet
Perimembranous





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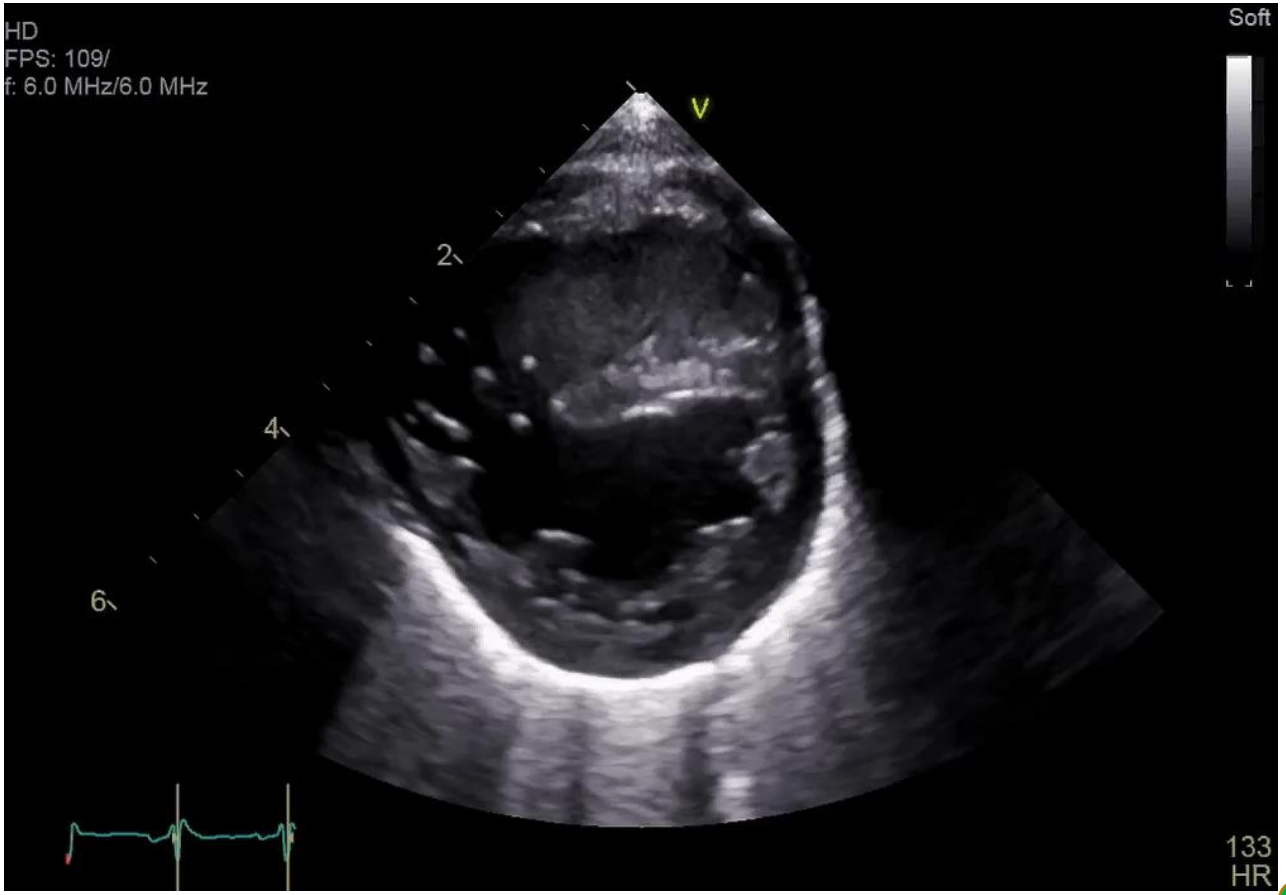
Inlet Muscular



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Inlet
Muscular

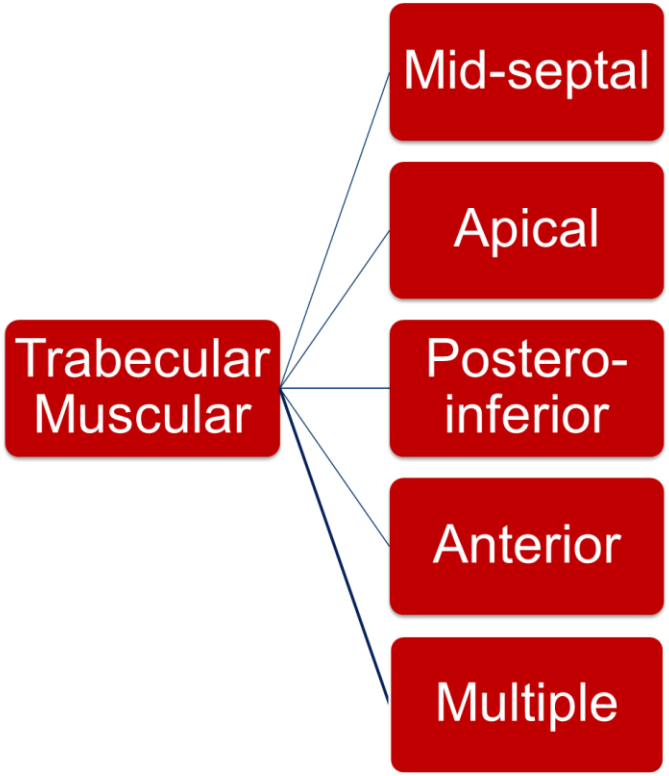

Table 1. International Society for Nomenclature of Paediatric and Congenital Heart Disease Classification Scheme for Ventricular Septal Defect (International Paediatric and Congenital Cardiac Code 07.10.00) as Incorporated in the International Classification of Diseases-11th Iteration

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   c. Inlet muscular VSD (07.11.02)
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   a. Trabecular muscular VSD: midseptal (07.11.04)
   b. Trabecular muscular VSD: apical (07.11.03)
   c. Trabecular muscular VSD: postero-inferior (07.11.12)
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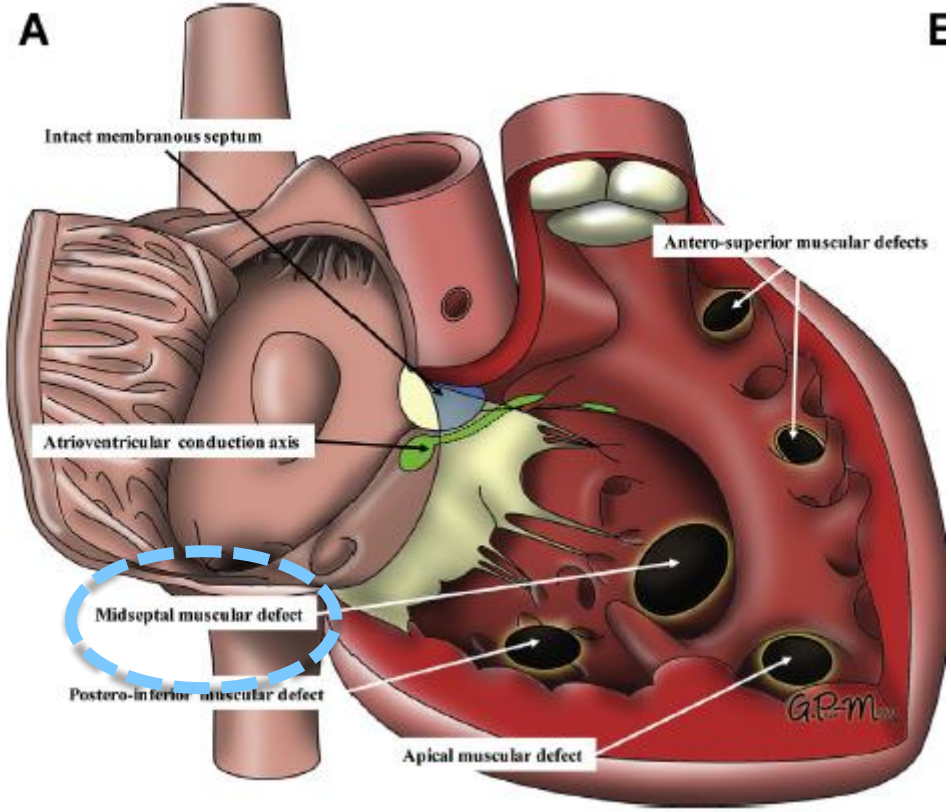
   e. Trabecular muscular VSD: multiple ("Swiss cheese" septum) (07.11.05)
4. Outlet VSD (07.12.00)
   a. Outlet VSD without malalignment (07.12.09)
      i. Outlet muscular VSD without malalignment (07.11.06)
      ii. Doubly committed juxta-arterial VSD without malalignment (07.12.01)
         1. Doubly committed juxta-arterial VSD without malalignment and with a muscular postero-inferior rim (07.12.02)
         2. Doubly committed juxta-arterial VSD without malalignment and with a fibrous postero-inferior rim (perimembranous extension) (07.12.03)
   b. Outlet VSD with anteriorly malaligned outlet septum (07.10.17)
      i. Outlet muscular VSD with anteriorly malaligned outlet septum (07.11.15)
      ii. Outlet perimembranous VSD with anteriorly malaligned outlet septum (07.10.04)
      iii. Doubly committed juxta-arterial VSD with anteriorly malaligned fibrous outlet septum (07.12.12)
         1. Doubly committed juxta-arterial VSD with anteriorly malaligned fibrous outlet septum and a muscular postero-inferior rim (07.12.07)
         2. Doubly committed juxta-arterial VSD with anteriorly malaligned fibrous outlet septum and a fibrous postero-inferior rim (perimembranous extension) (07.12.05)
   c. Outlet VSD with posteriorly malaligned outlet septum (07.10.18)
      i. Outlet muscular VSD with posteriorly malaligned outlet septum (07.11.16)
      ii. Outlet perimembranous VSD with posteriorly malaligned outlet septum (07.10.19)
      iii. Doubly committed juxta-arterial VSD with posteriorly malaligned fibrous outlet septum (07.12.13)
         1. Doubly committed juxta-arterial VSD with posteriorly malaligned fibrous outlet septum and a muscular postero-inferior rim (07.12.08)
         2. Doubly committed juxta-arterial VSD with posteriorly malaligned fibrous outlet septum and a fibrous postero-inferior rim (perimembranous extension) (07.12.06)



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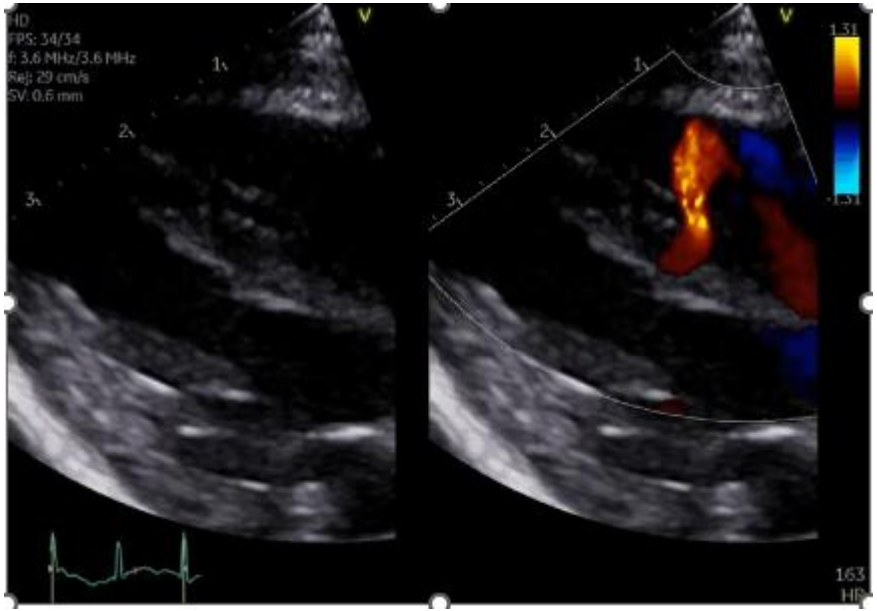
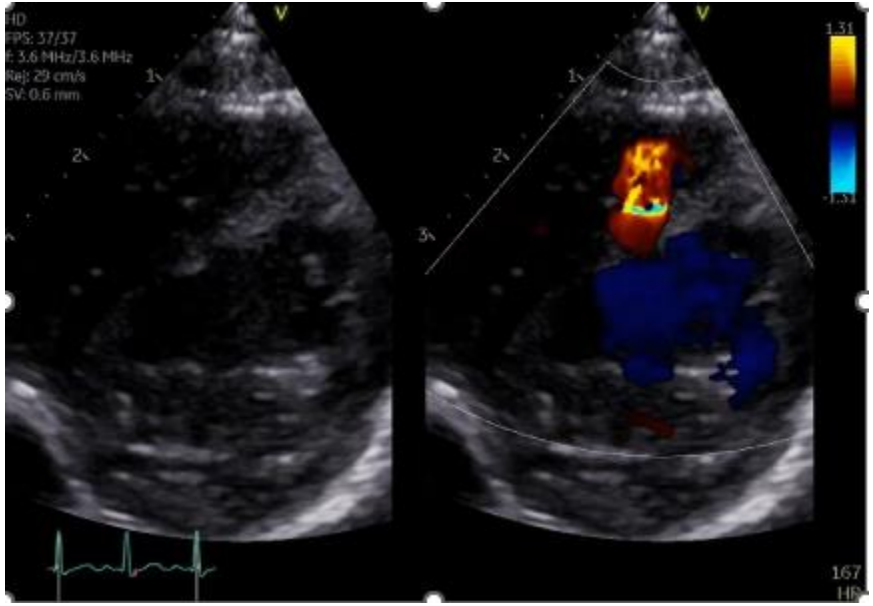
Trabecular Muscular

Mid-septal





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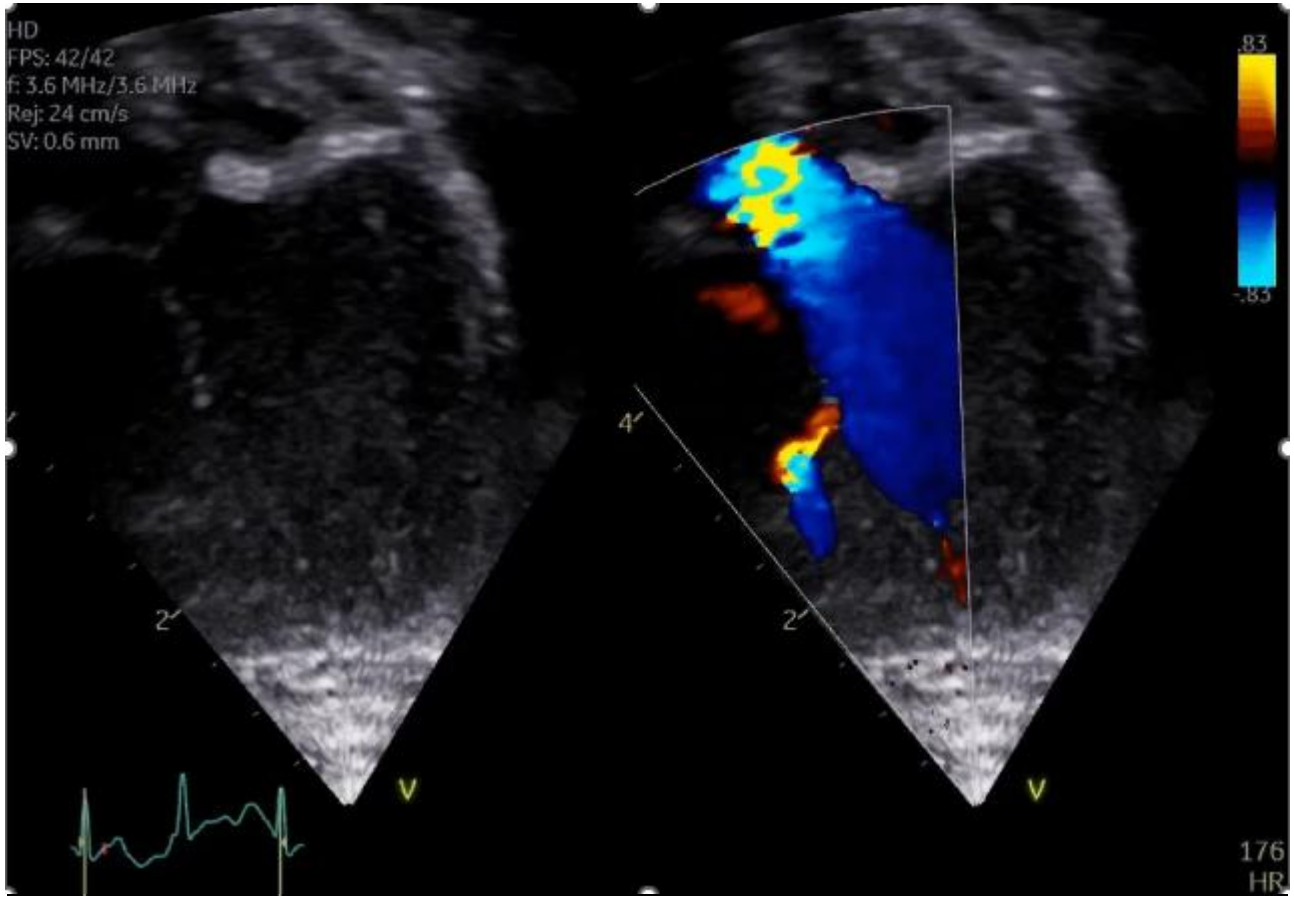
Trabecular Muscular

Mid-septal



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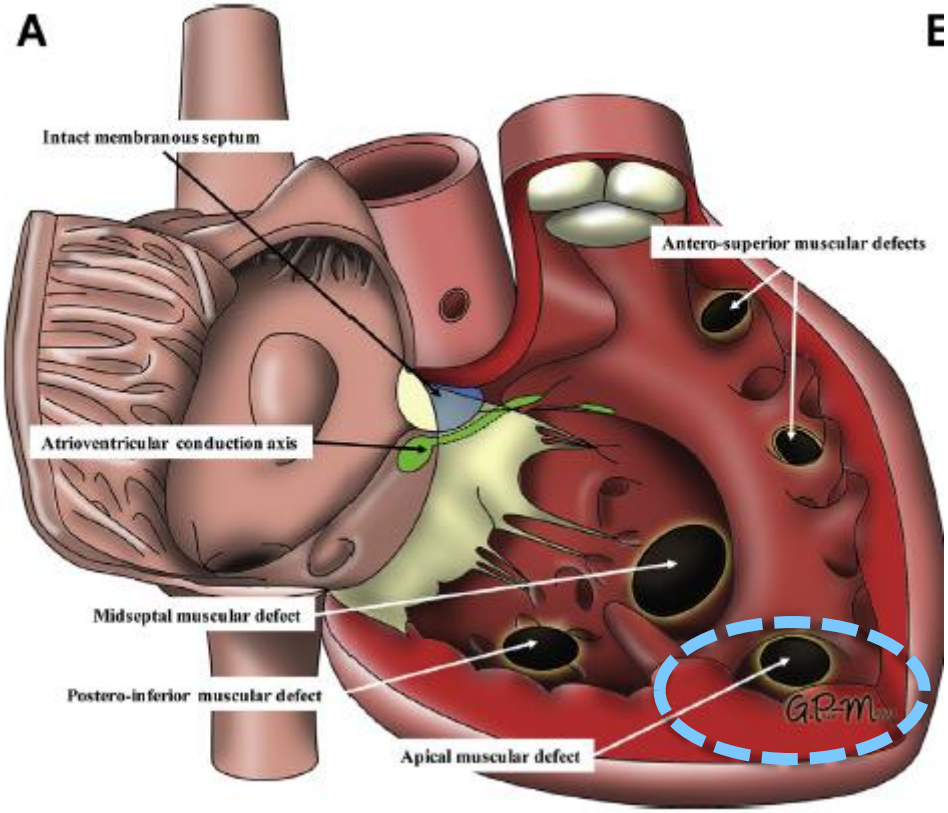
Trabecular Muscular

Mid-septal



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Trabecular
Muscular

Apical

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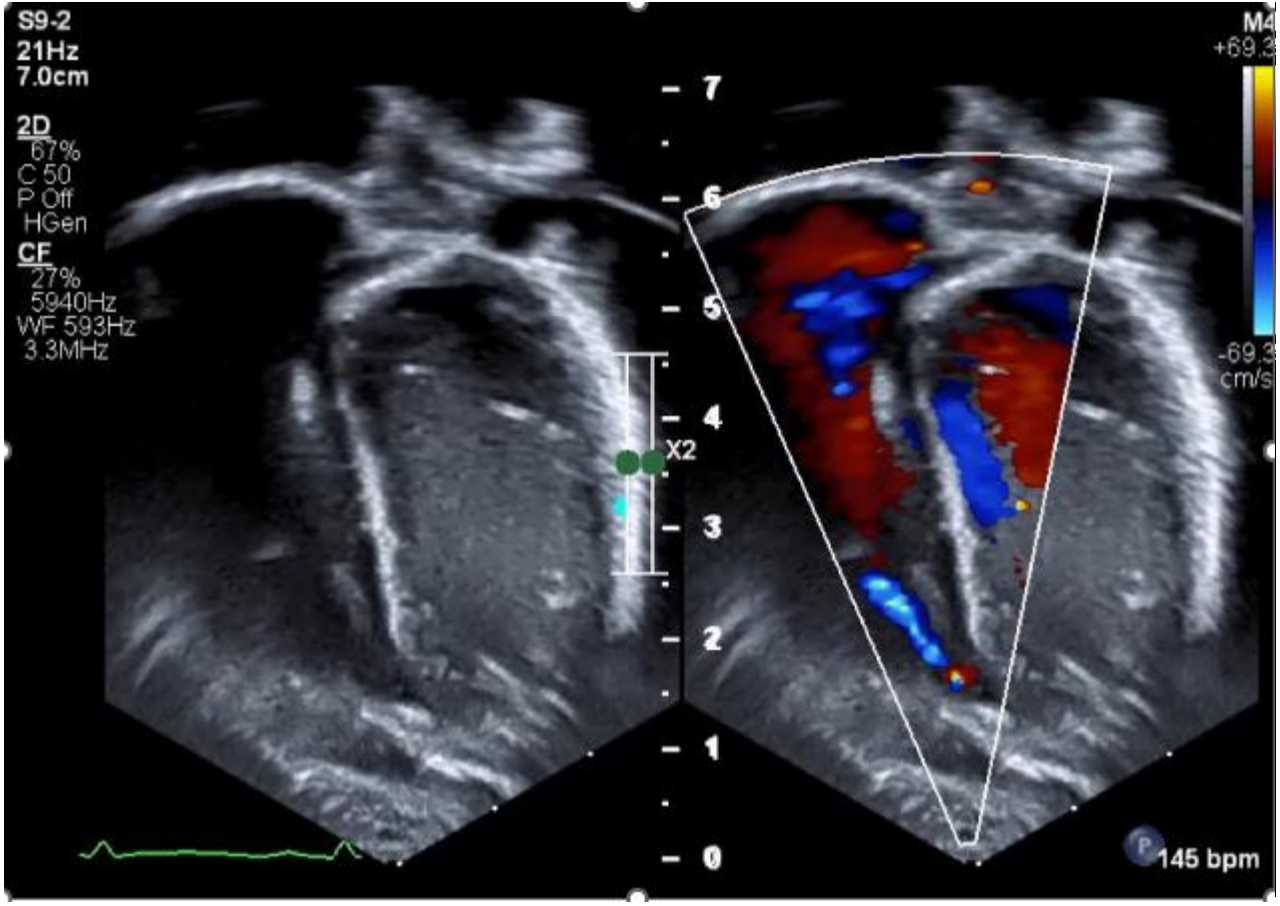

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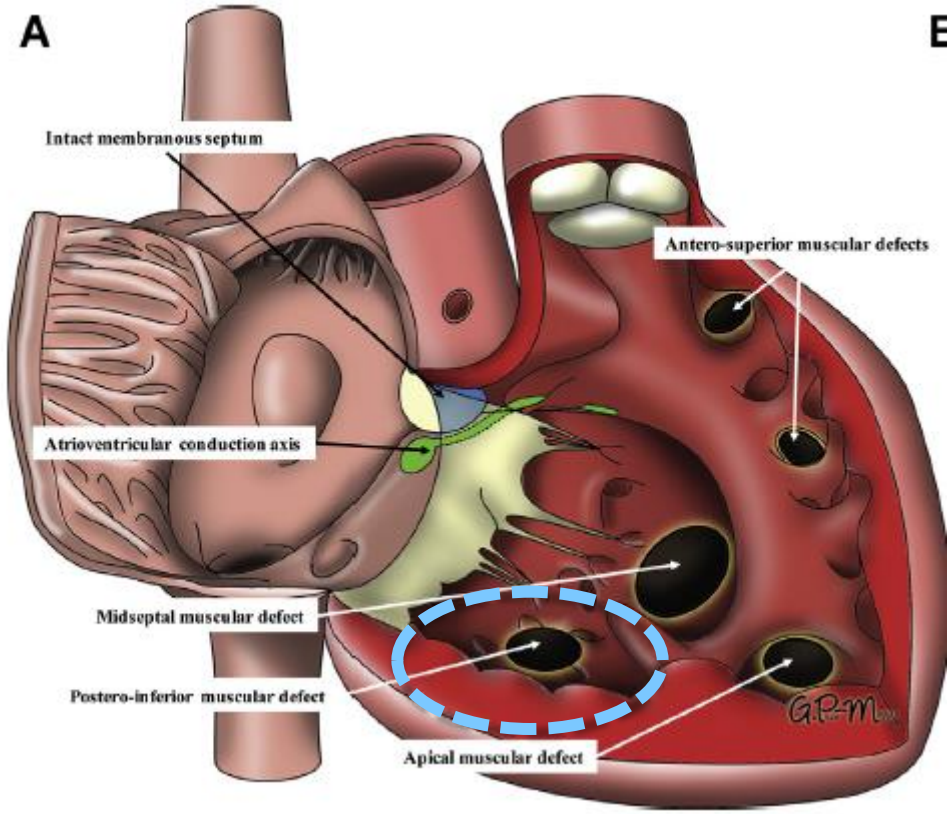
Trabecular Muscular

Apical



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Trabecular
Muscular
Postero-inferior

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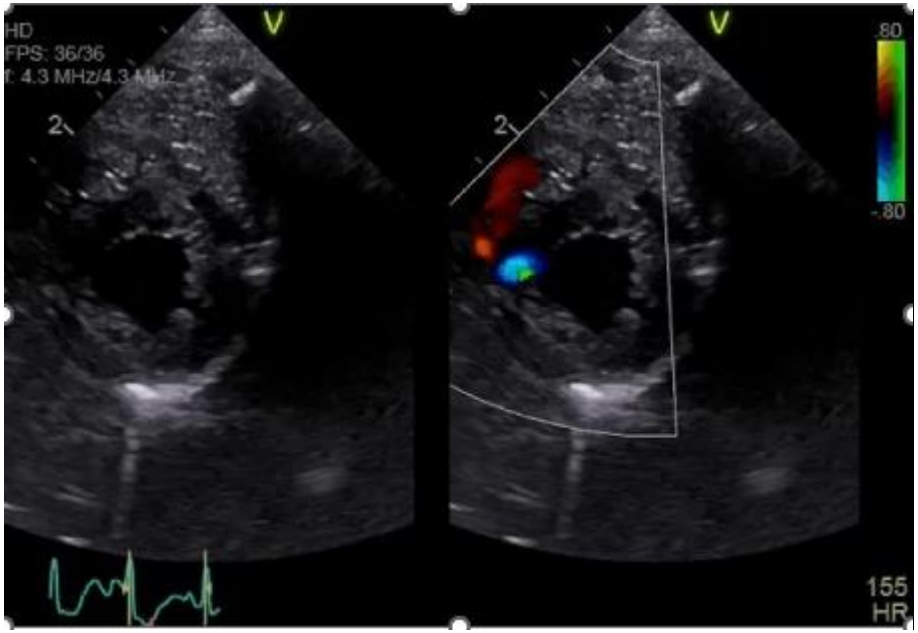

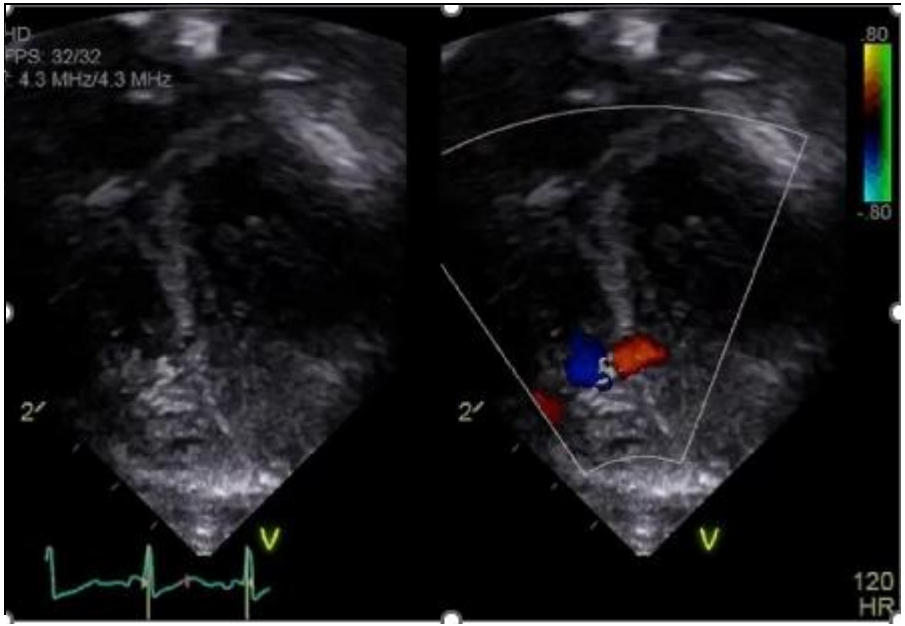

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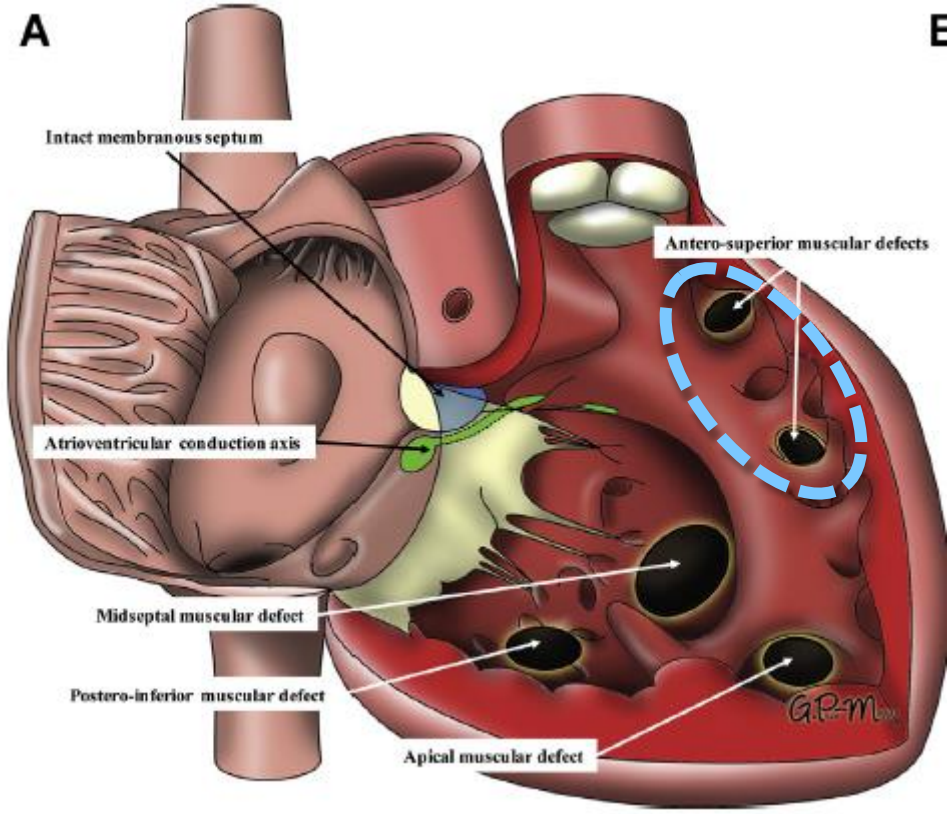
Trabecular Muscular

Postero-inferior



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Trabecular
Muscular

Anterior

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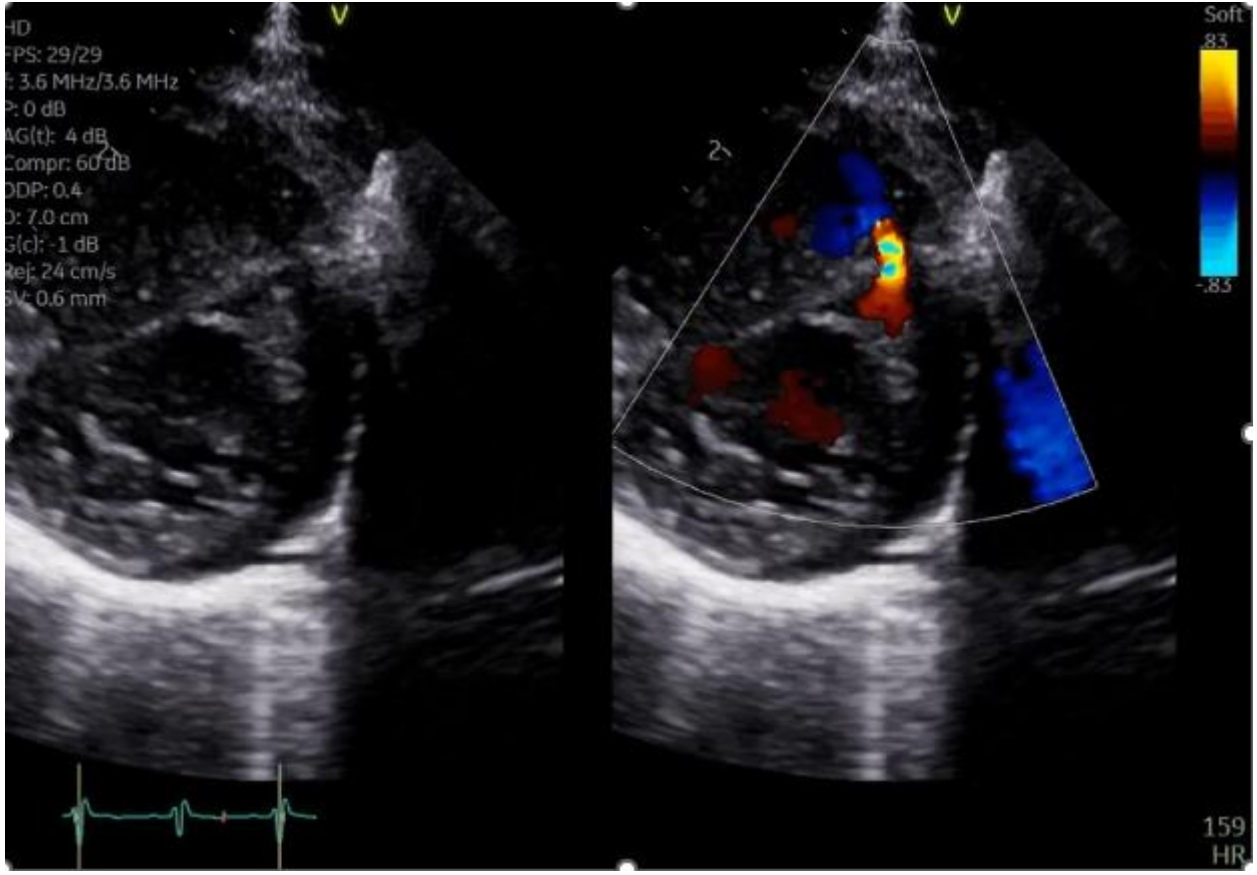

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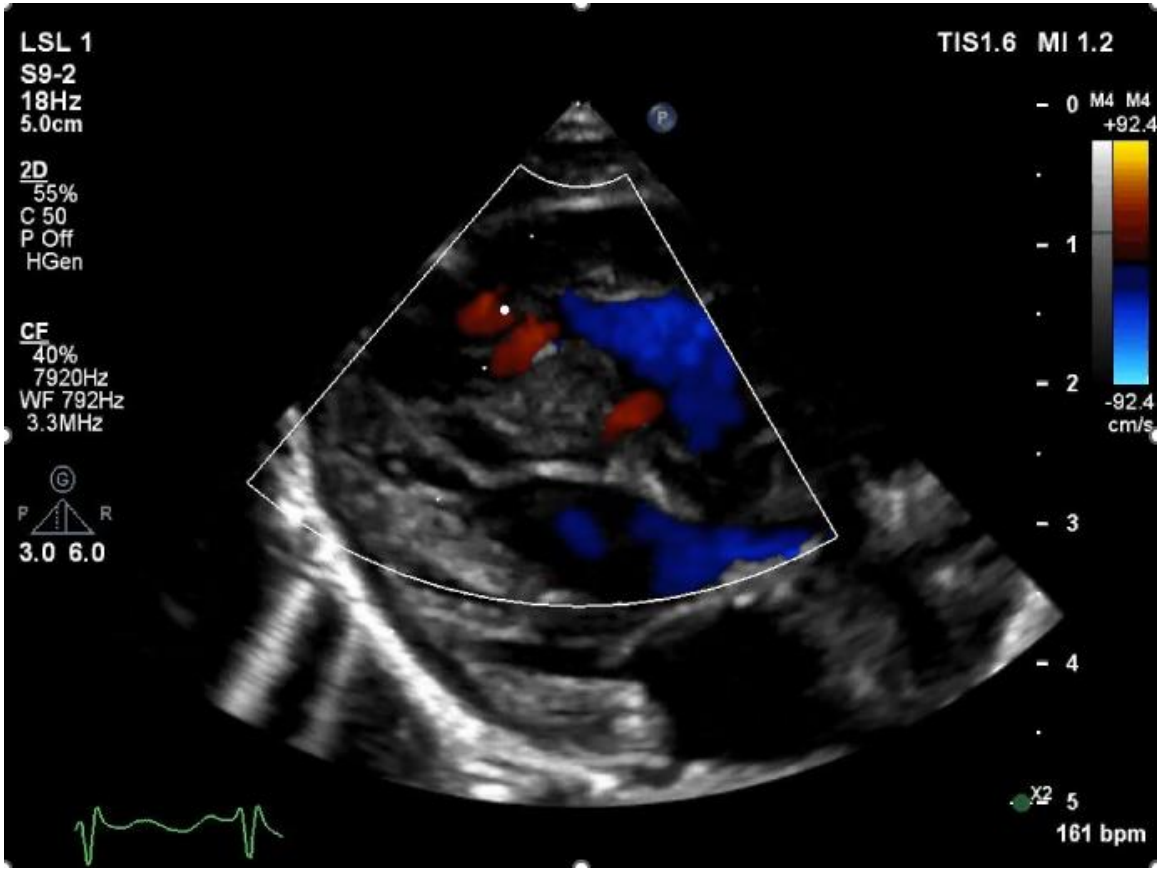
Trabecular
Muscular

Anterior



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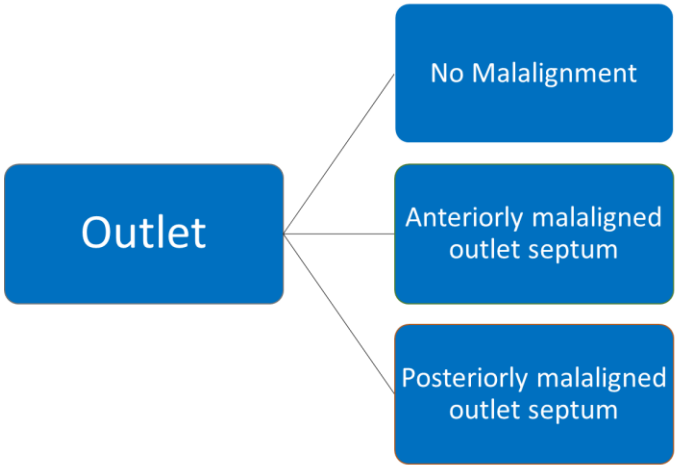
Trabecular
Muscular

Multiple



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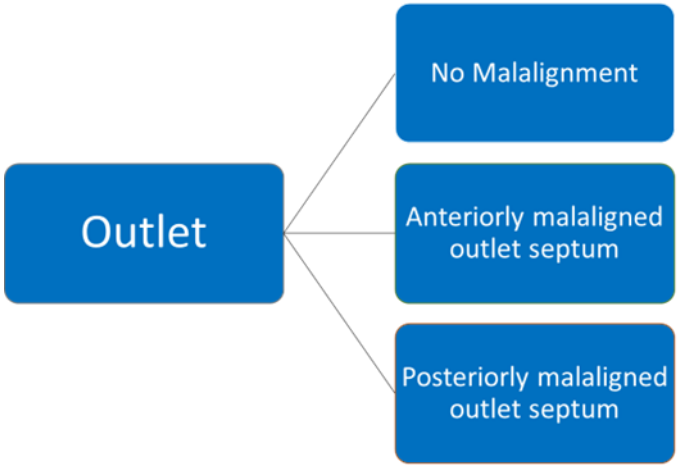
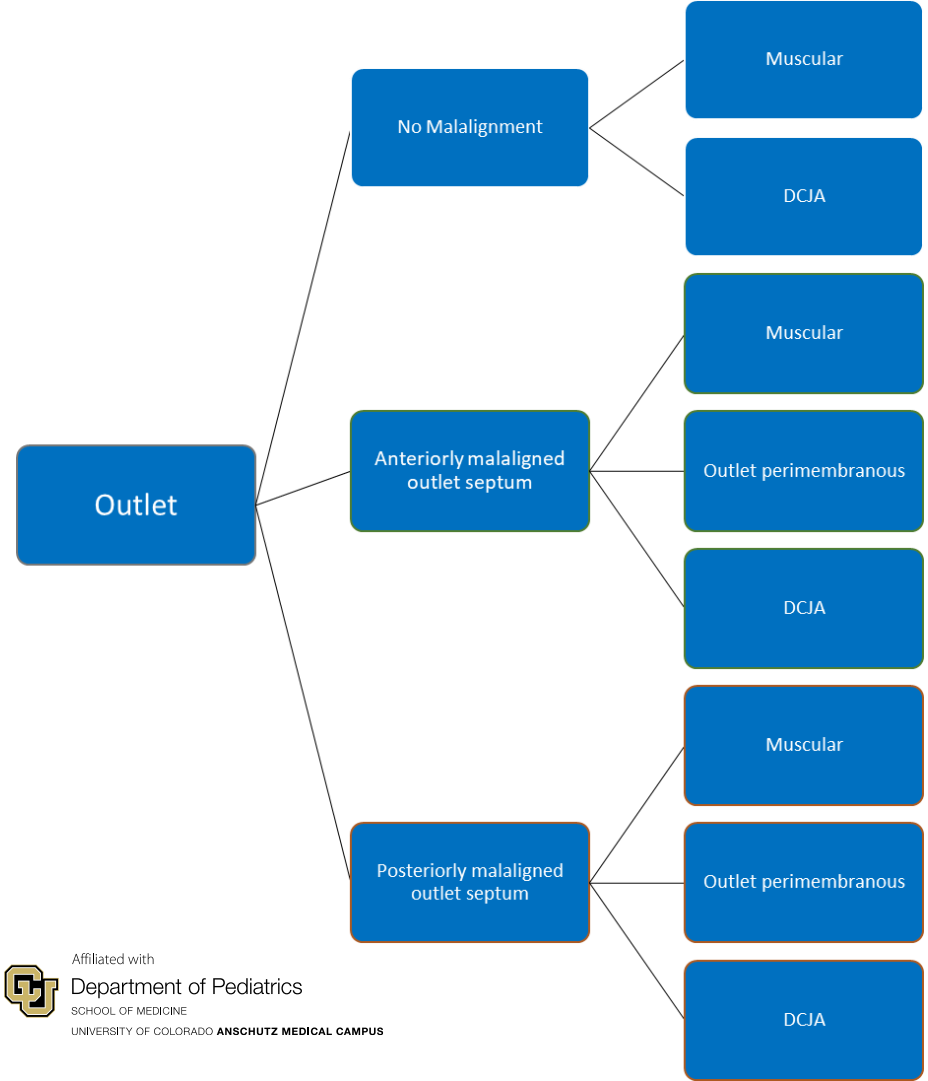


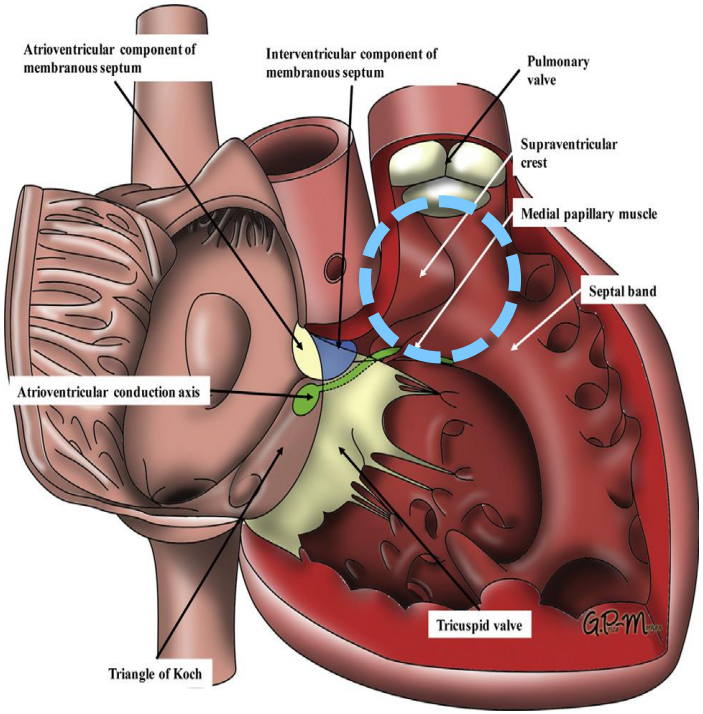
= “Doubly Committed Juxta-arterial” (DCJA)

= “Tetralogy”

= “VSD/IAA”


Outlet
No Malalignment
Muscular
DCJA
Anteriorly malaligned outlet septum
Muscular
Outlet perimembranous
DCJA
Posteriorly malaligned outlet septum
Muscular
Outlet perimembranous
DCJA

- Location
  - Opens to outlet portion of RV
  - Between limbs (Y) of septal band
  - Behind/near anterior leaflet of TV
  - Above antero-septal commissure of TV
  - With/without malalignment of outlet septum



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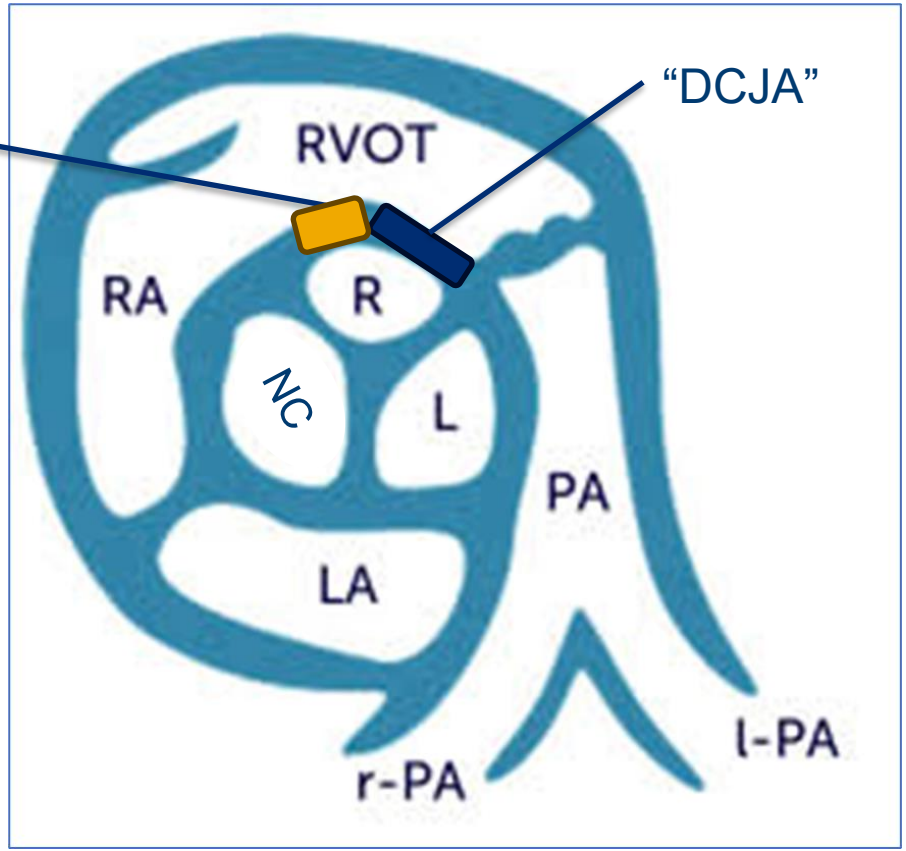
Outlet

Central
Perimembranous



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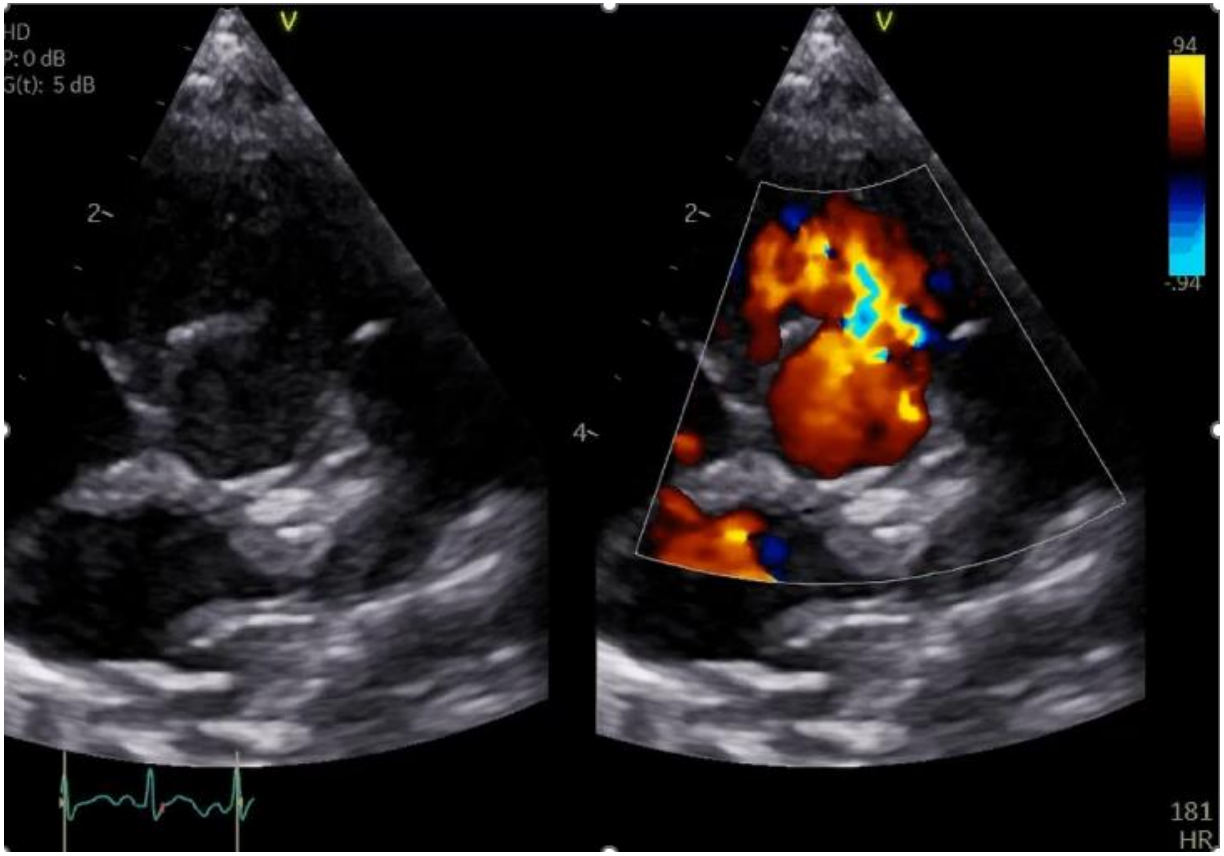

Outlet

"Doubly Committed Juxta-arteria"

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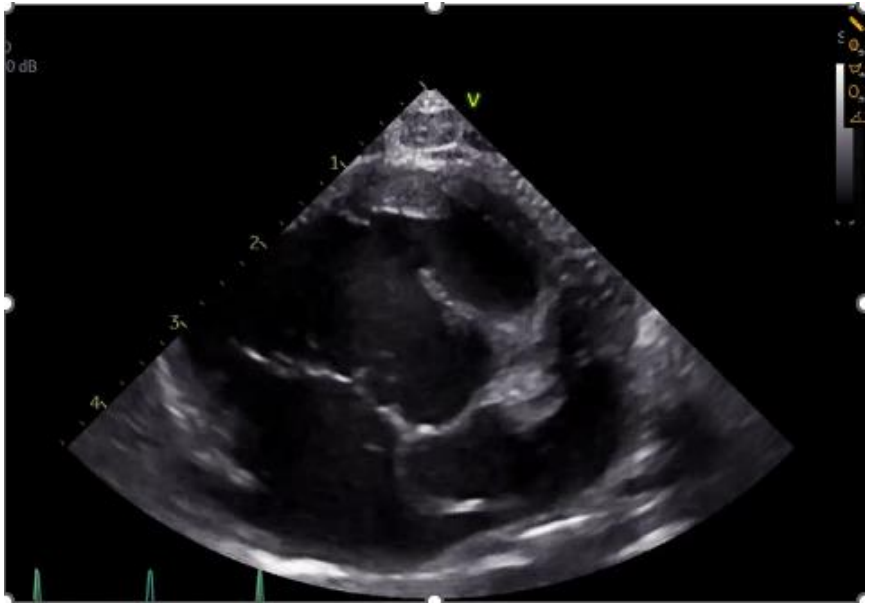

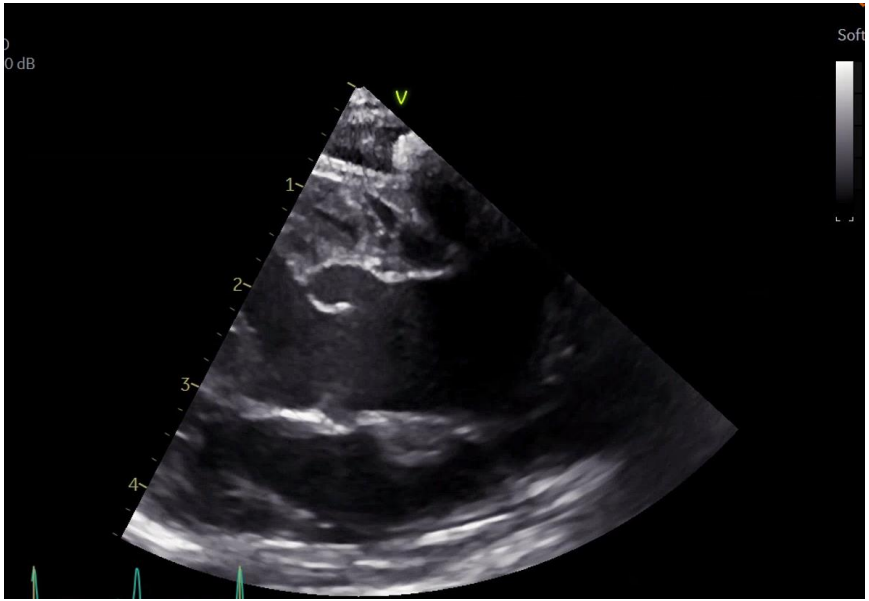

Outlet

Anteriorly malaligned outlet septum

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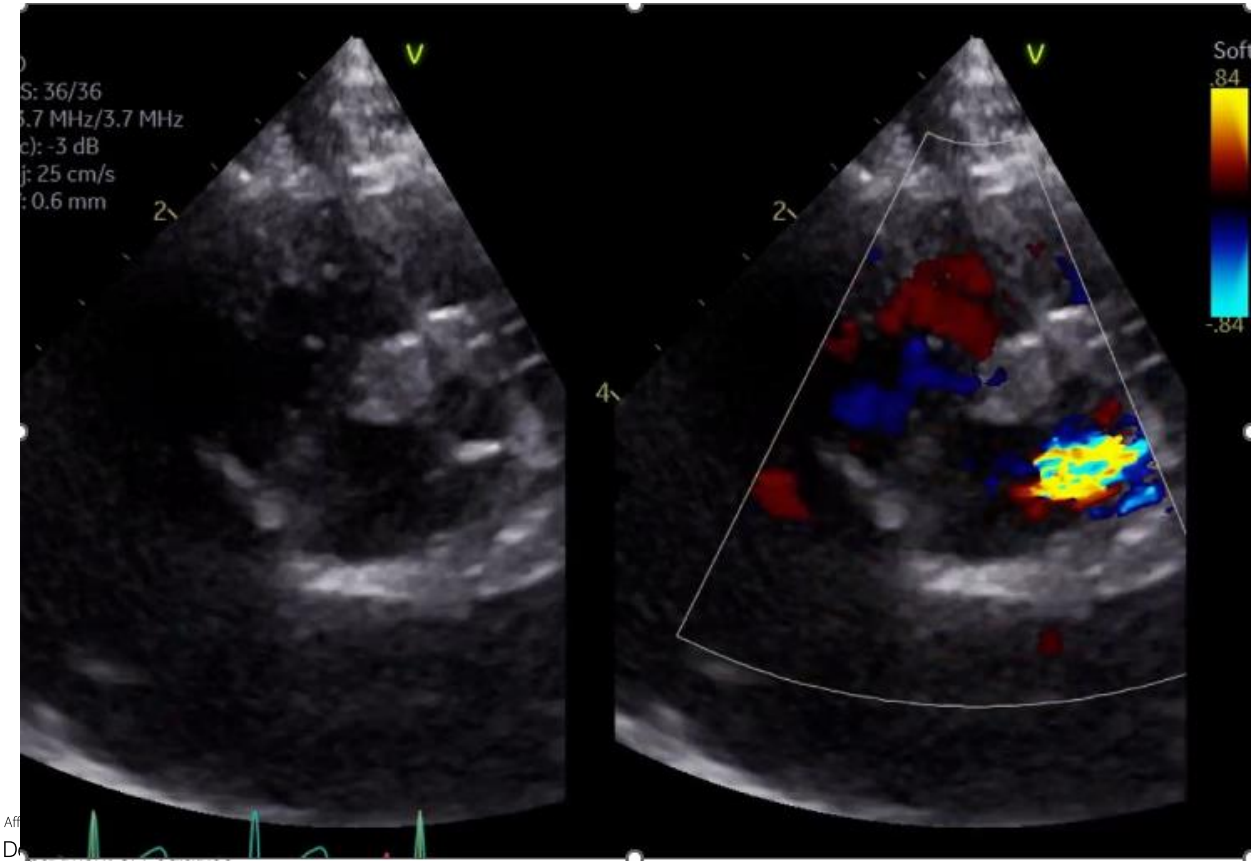
Other Things To Look For

Left-sided dilation

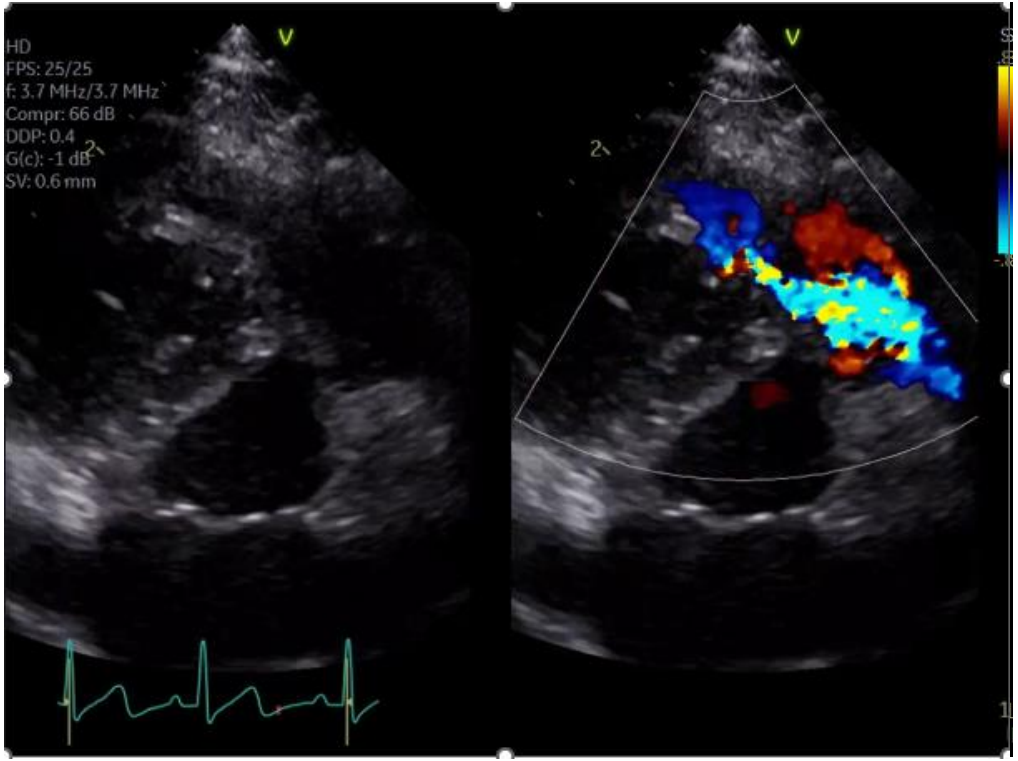
Other Things To Look For

Aortic Valve Insufficiency



Other Things To Look For

Double Chamber RV



If All Else Fails – Describe What You See

Thank You!

References

- **Special Thanks to Dr. Richard Friesen** – many of the slides and echo images are borrowed from his prior presentation on VSD Nomenclature Mapping
- Lopez L, et.al. Classification of Ventricular Septal Defects for the Eleventh Iteration of the International Classification of Diseases-Striving for Consensus: A Report From the International Society for Nomenclature of Paediatric and Congenital Heart Disease. Ann Thorac Surg. 2018 Nov;106(5):1578-1589. doi: 10.1016/j.athoracsur.2018.06.020. Epub 2018 Jul 19. PMID: 30031844.
- Sharma PS, Naperkowski A, Bauch TD, Chan JYS, Arnold AD, Whinnett ZI, Ellenbogen KA, Vijayaraman P. Permanent His Bundle Pacing for Cardiac Resynchronization Therapy in Patients With Heart Failure and Right Bundle Branch Block. Circ Arrhythm Electrophysiol. 2018 Sep;11(9):e006613. doi: 10.1161/CIRCEP.118.006613. PMID: 30354292.
- Forbus GA, Shirali GS. Anomalies of the Ventricular Septum. Echocardiography in Pediatric and Congenital Heart Disease; 2009:175-87.