

전공의 연수교육
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Sequential Segmental Analysis

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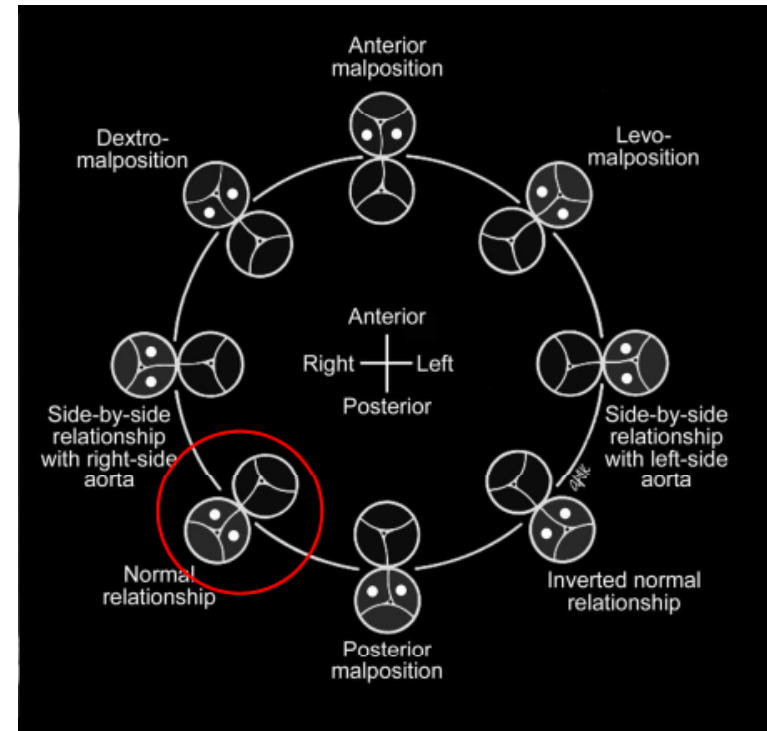
Sequential Segmental Analysis

- Recognition of the topological arrangement
- Analysis of the fashions in which the segments are joined or are not joined to each other

- 1960 Maria de la Cruz
- 1970 Richard van Praagh
- 1980 Robert H Anderson

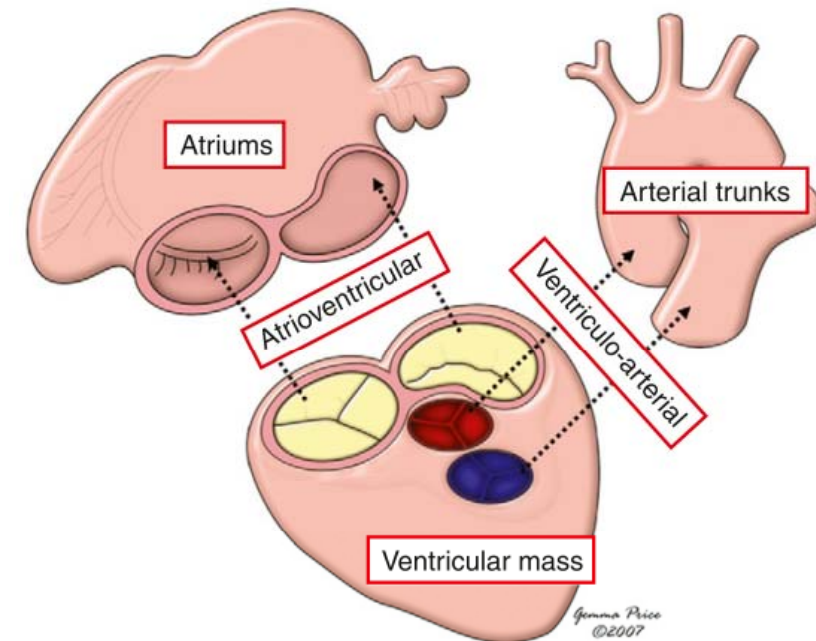
Three Facets

- Morphology
- Relationship
- Connection



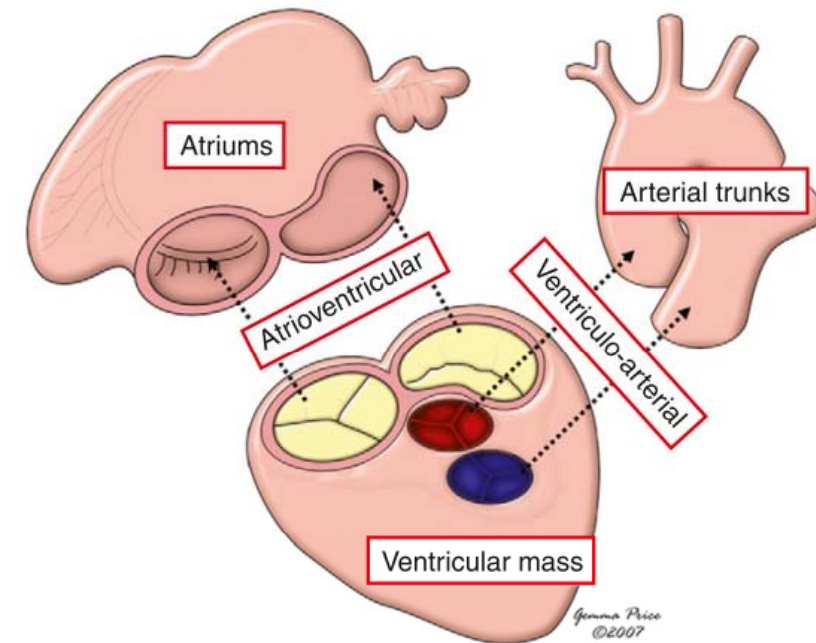
Steps !

- Arrangement of the atrial chambers
- Nature of the atrioventricular junctions
- Arrangement of the ventricular chambers
- Nature of the ventriculo-arterial junctions
- Relationships of the arterial trunks



Steps !

- Arrangement of the atrial chambers
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The definition of RA

- Located at the right side ???
- Connected to the SVC and IVC ???
- Connected to the TV ???

Atrial identification

- Atrial appendages
 - The most reliable component to distinguish between morphologically RA and LA
- Pectinate muscles
- Crista terminalis
- Septal morphology

Atria

Right Atrium

- **Triangular appendage** with a broad junction
- Pectinate muscles **extending to AV** junction
- **Crista terminalis**
- **Fossa ovalis** with a limb

Left Atrium

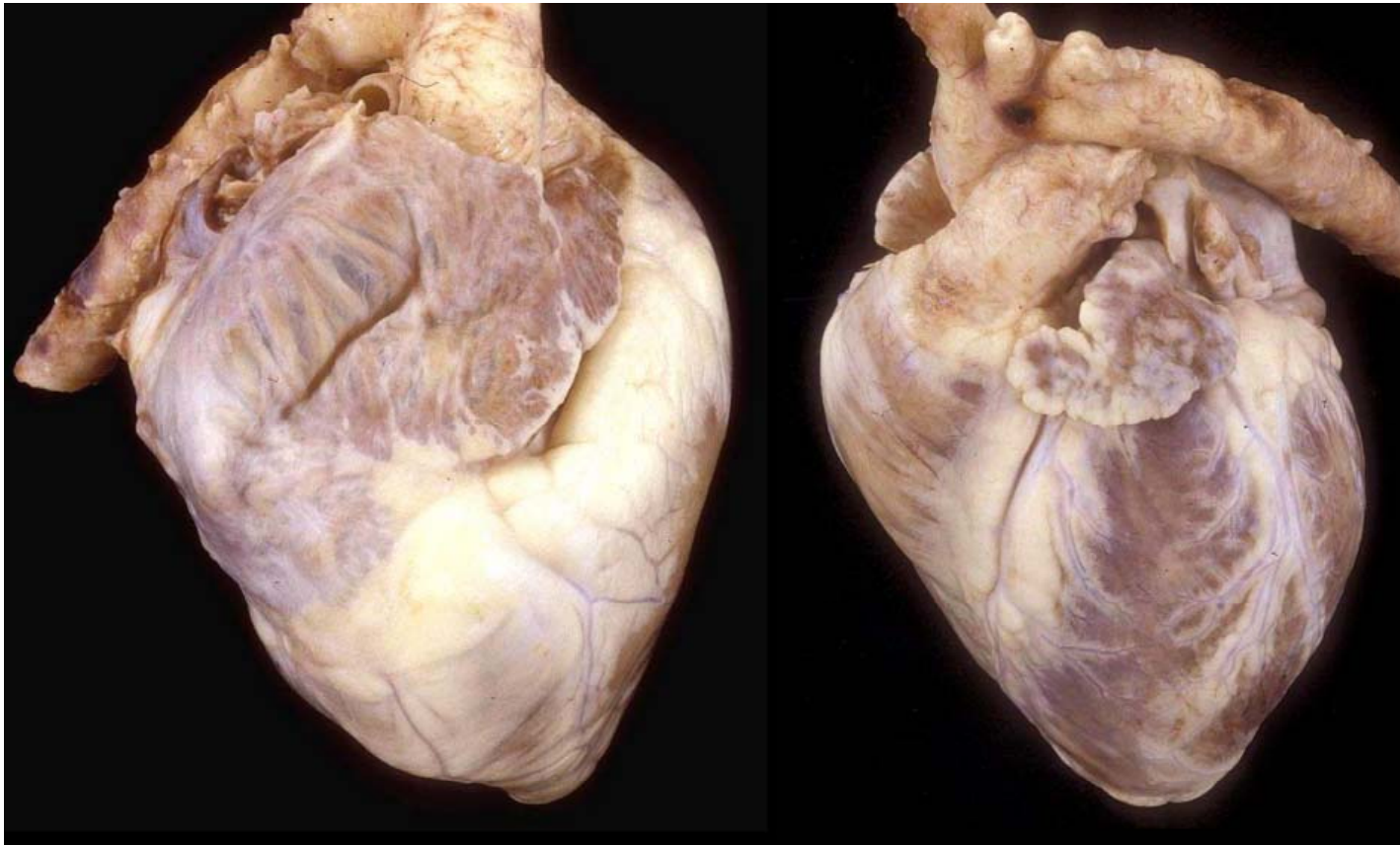
- **Finger-like appendage** with a narrow junction
- Pectinate muscles **not extending** to AV junction
- No crista terminalis
- No fossa ovalis

Right Atrium

- **Triangular appendage** with a broad junction
- Pectinate muscles **extending to AV junction**
- **Crista terminalis**
- **Fossa ovalis** with a limb

Left Atrium

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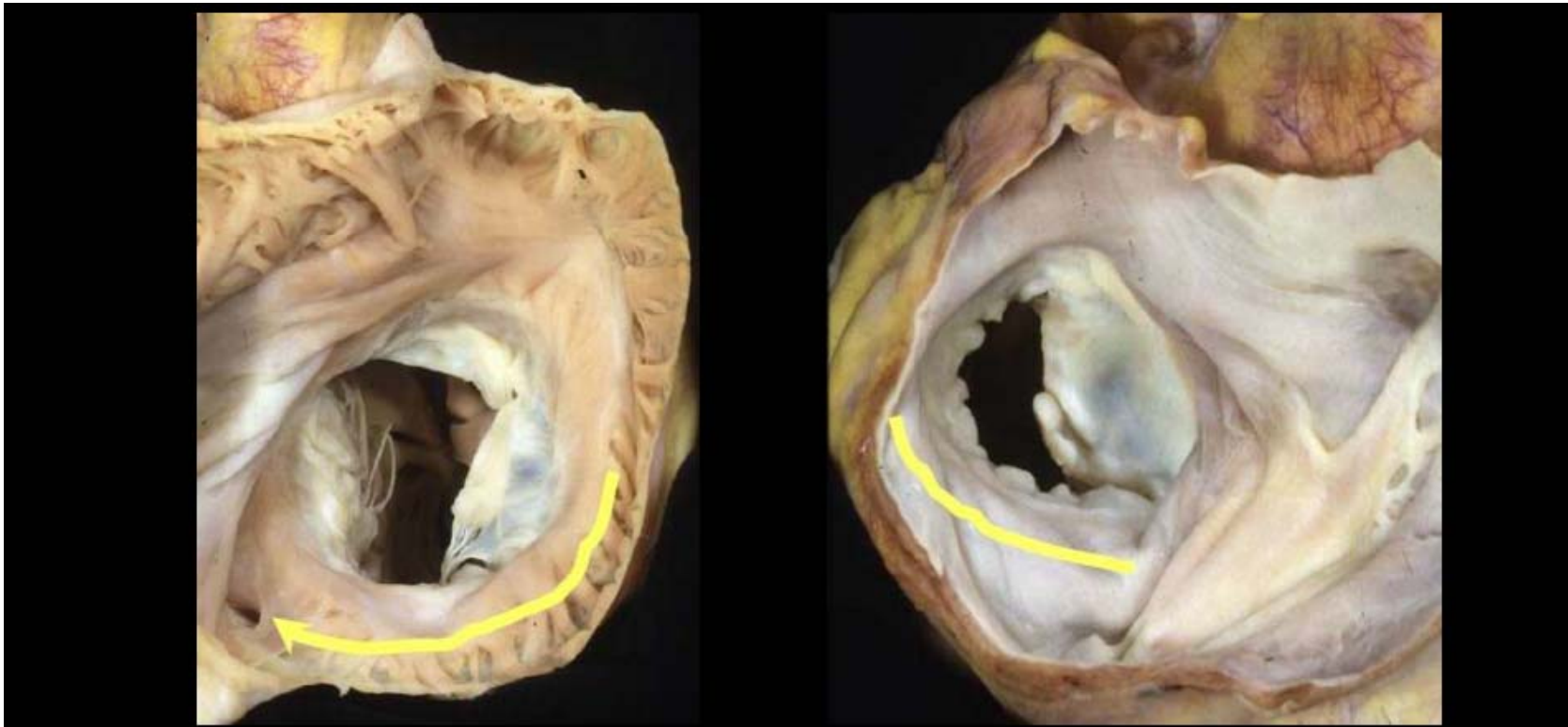
Extent of pectinate muscles

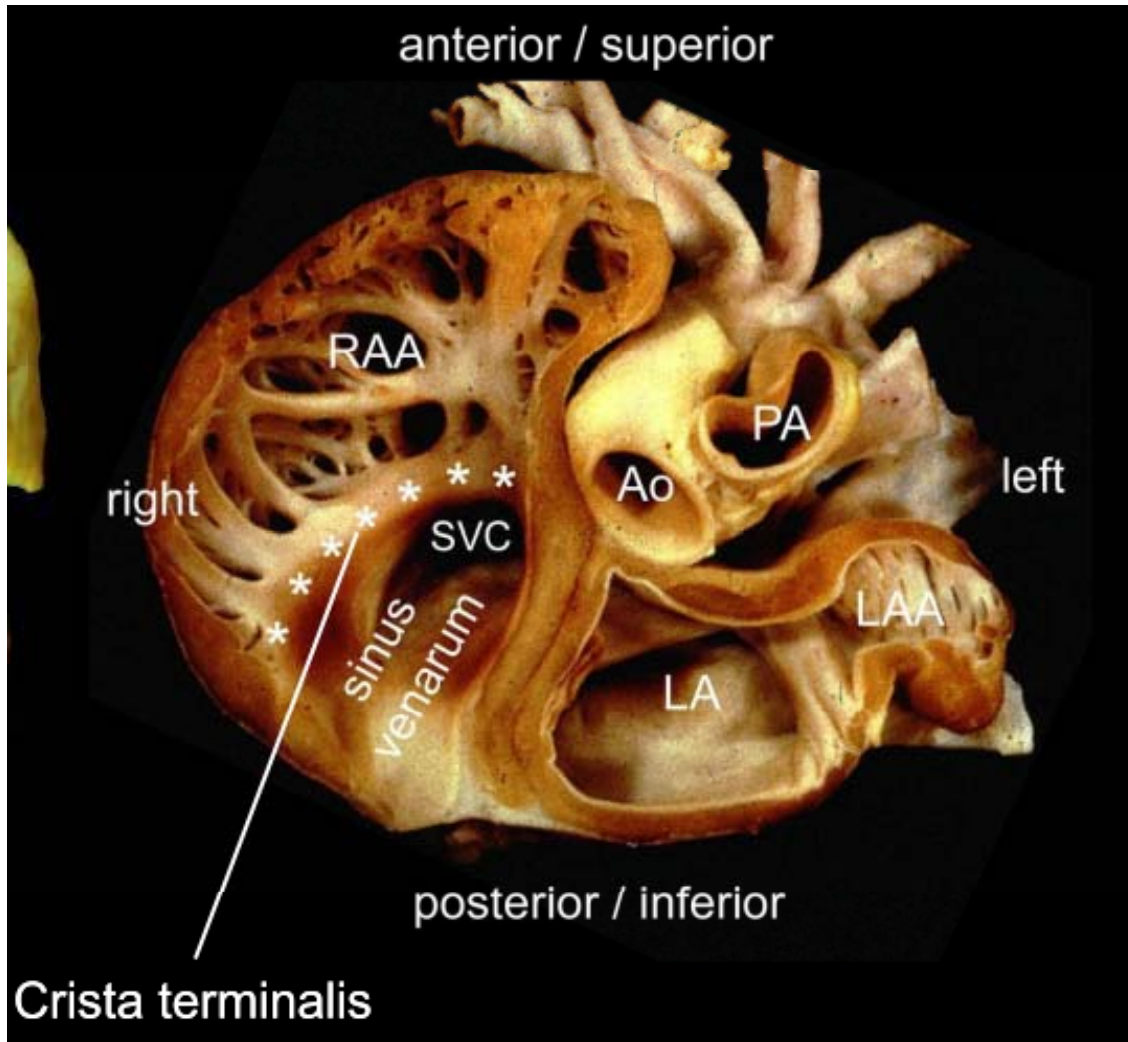
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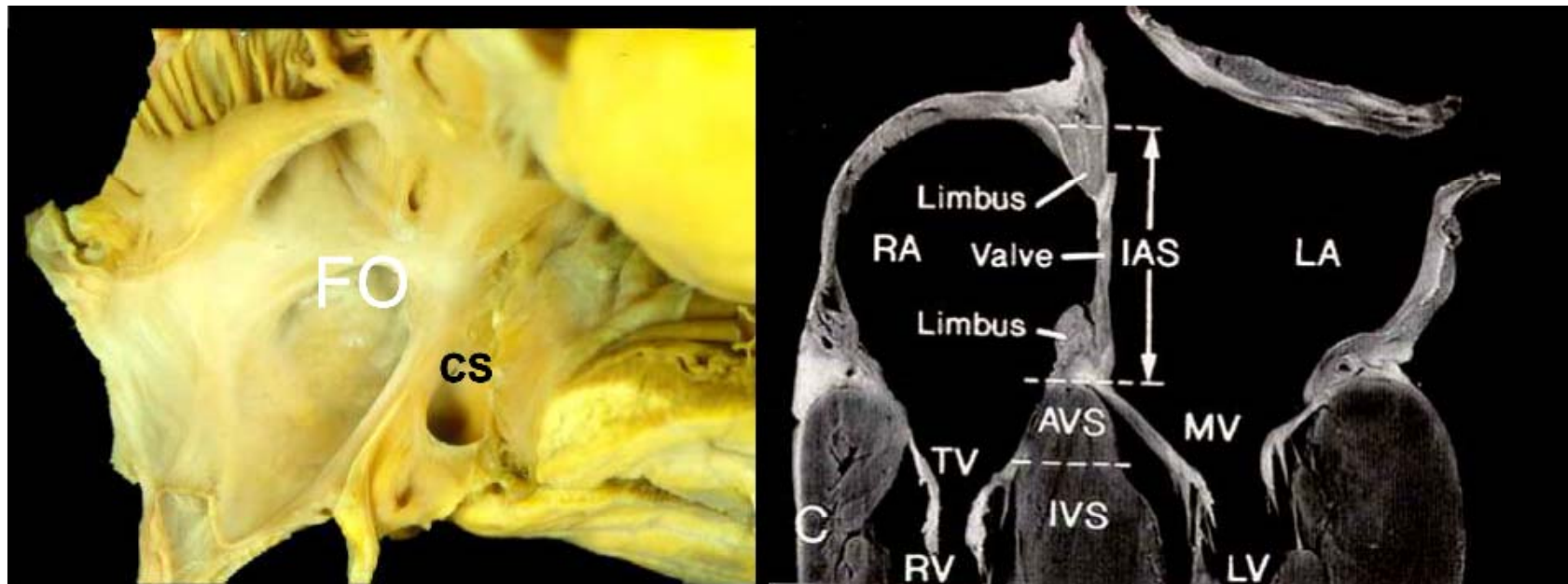
Interatrial septum

Right Atrium

- **Triangular appendage** with a broad junction
- Pectinate muscles **extending to AV junction**
- **Crista terminalis**
- **Fossa ovalis** with a limb

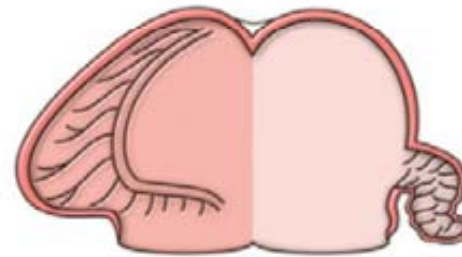
Left Atrium

- **Finger-like appendage** with a narrow junction
- Pectinate muscles **not extending to AV junction**
- No crista terminalis
- No fossa ovalis

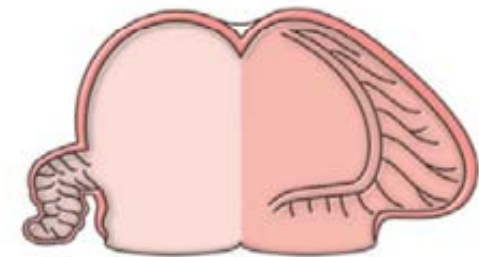


Atrial Arrangement

- Situs Solitus
- Situs Inversus
- Isomerism



Usual



Mirror-imaged

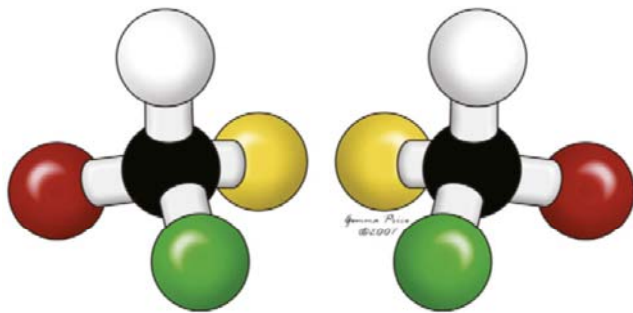


Right isomerism



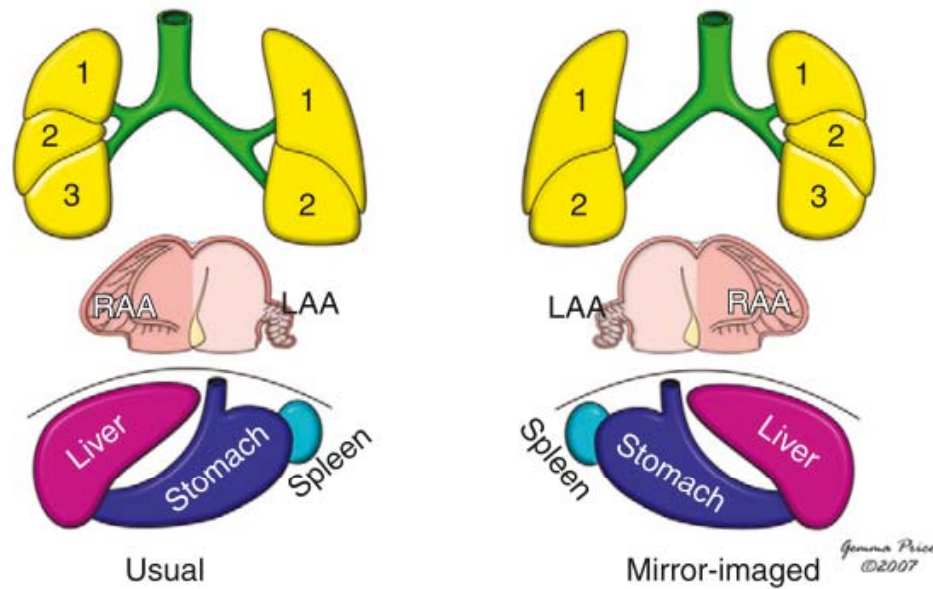
Left isomerism

Jemma Price
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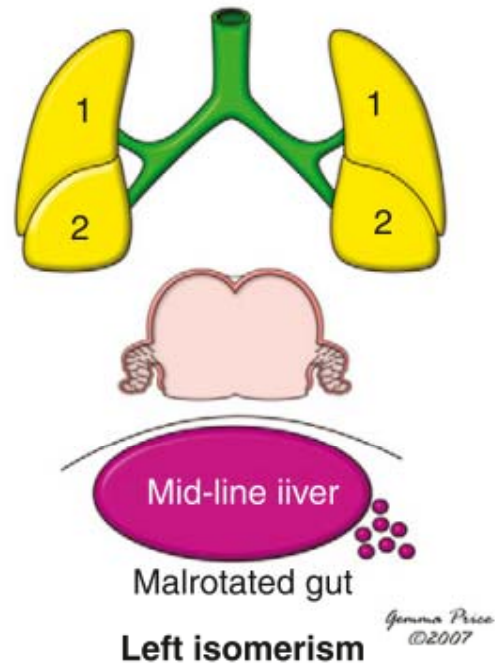
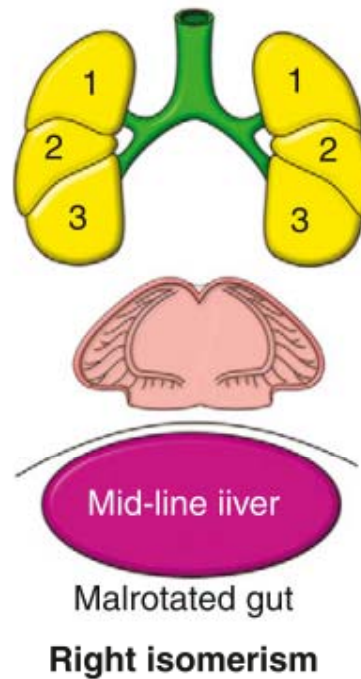


Recognition of Atrial Arrangement

- Almost always, the morphology of the appendages is in **harmony with** the arrangements of the **thoracic and abdominal organs**

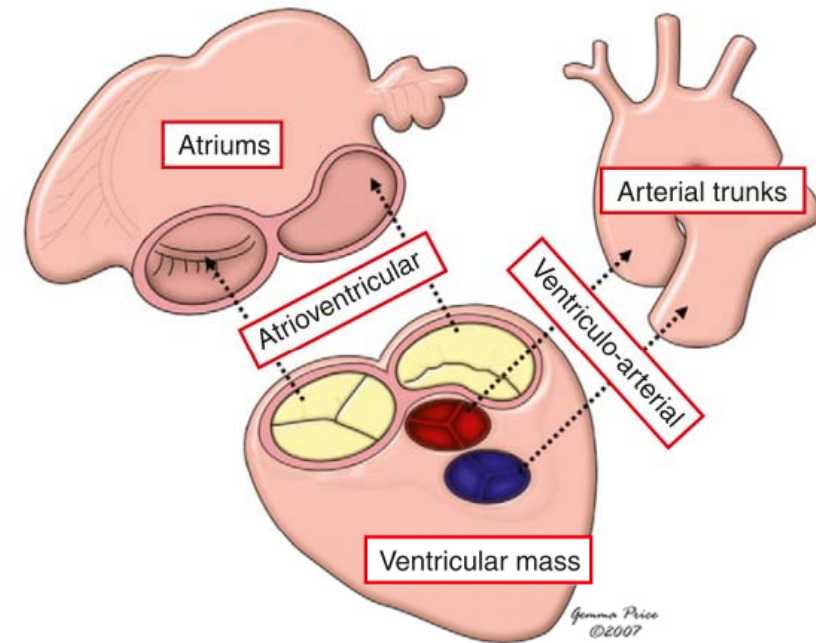


Isomerism of the Atrial Appendages (Visceral Heterotaxy)



Steps !

- Arrangement of the atrial chambers
- Nature of the atrioventricular junctions
- Arrangement of the ventricular chambers
- Nature of the ventriculo-arterial junctions
- Relationships of the arterial trunks



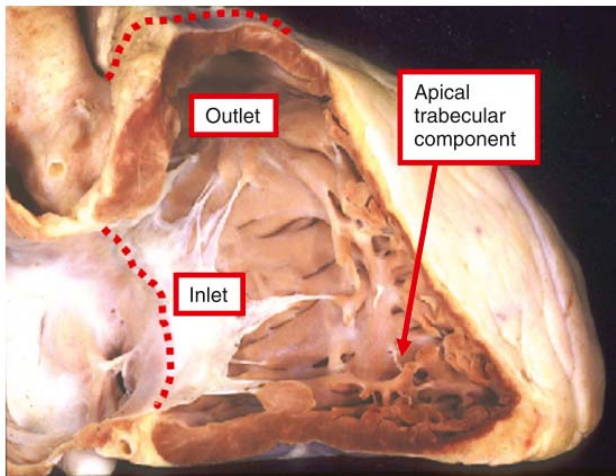
Three Components of Ventricle

- Inlet
- Apical Trabecular
- Outlet

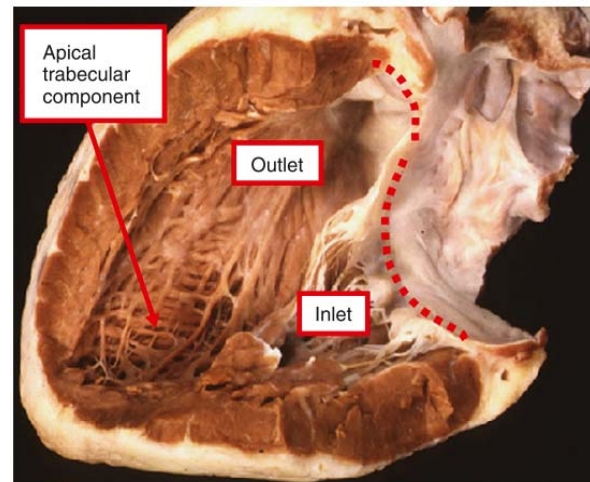
Three Components of Ventricle

- **Apical Trabecular**

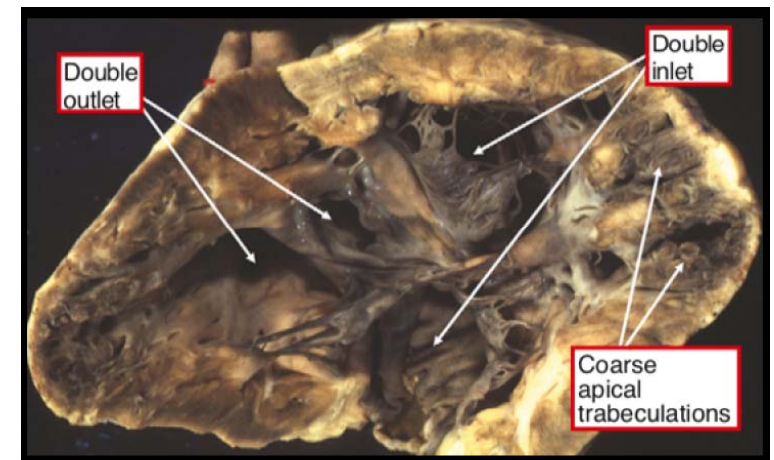
- Most universally present in normal, malformed, and incomplete ventricles
- Pattern of the apical trabeculations
 - Distinguish point morphologically right (Coarse) from left (Constant)



mRV



mLV

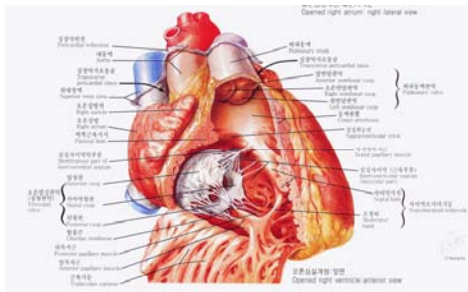


Intermediate Morphology

Ventricles

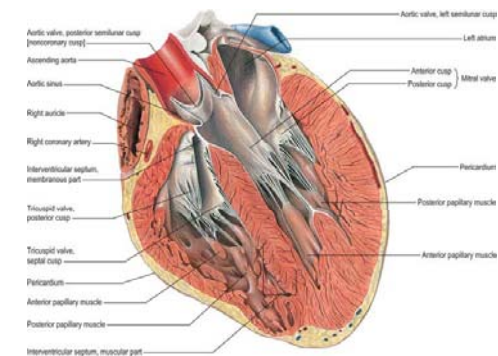
RV

- **Trabeculations:** heavy and irregular
- Moderator band
- Septal attachment of AV valve: more apical
- **Septal attachment of papillary muscles**



LV

- **Trabeculations:** fine and regular
- No moderator band
- Septal attachment of AV valve: more cranial
- **No septal attachment of papillary muscles**

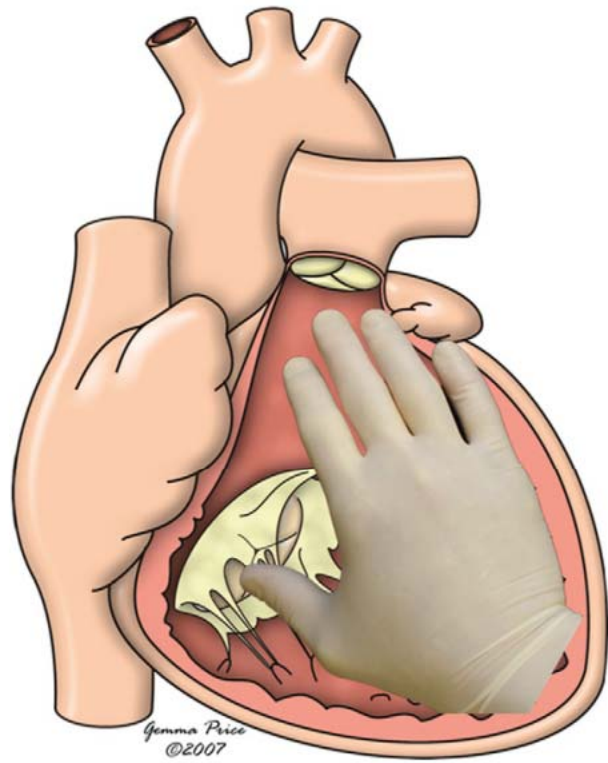


Ventricular Topology

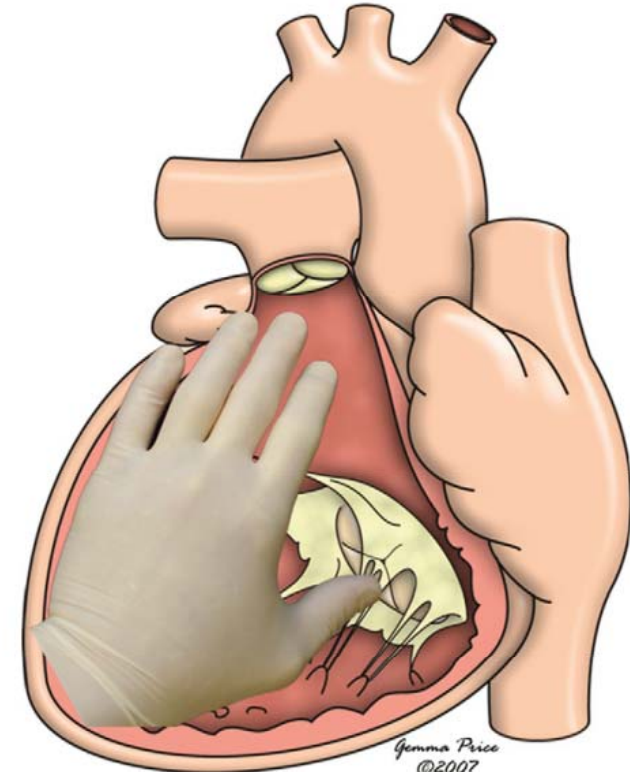
- The way in which the two ventricles are related within the ventricular mass
- Two basic patterns
 - D-ventricular loop
 - L-ventricular loop

Ventricular Topology

D-Ventricular Loop

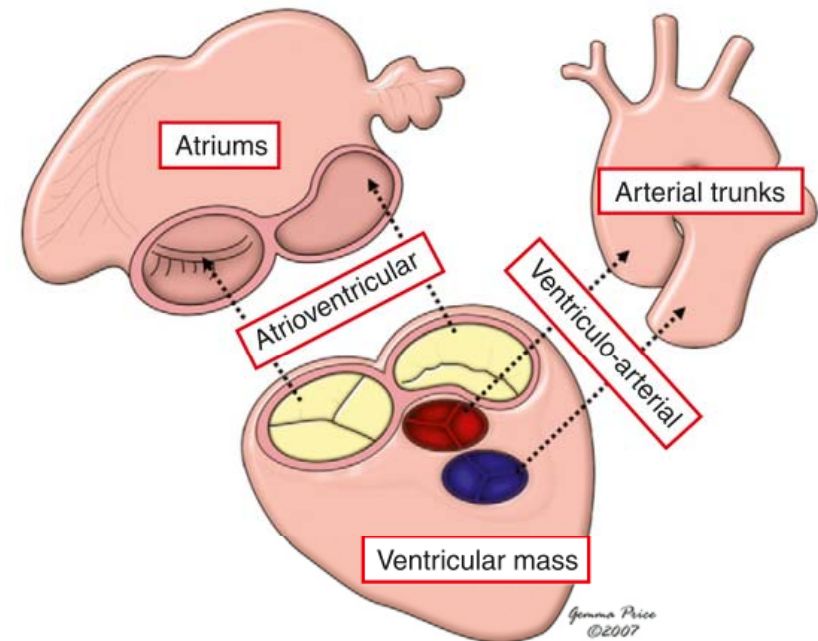


L-Ventricular Loop



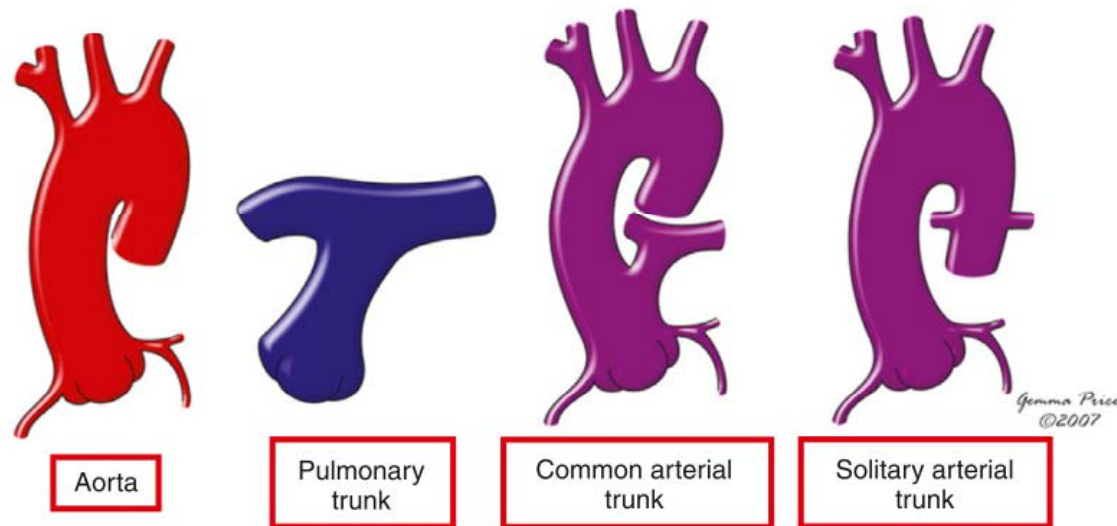
Steps !

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- Relationships of the arterial trunks



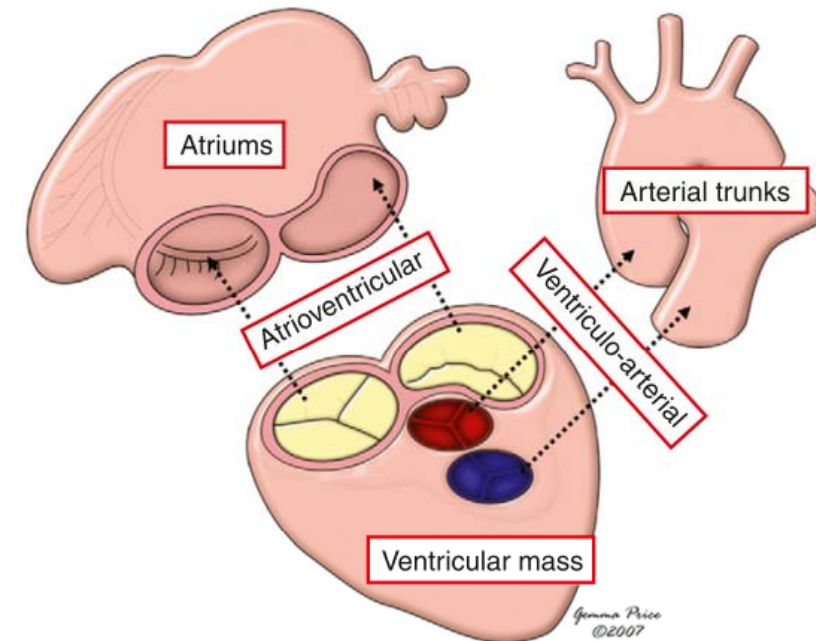
Morphology of the Great Arteries

- No intrinsic features which enable an aorta to be distinguished from a pulmonary trunk, or from a common or solitary arterial trunk
- Branching pattern of the trunks



Steps !

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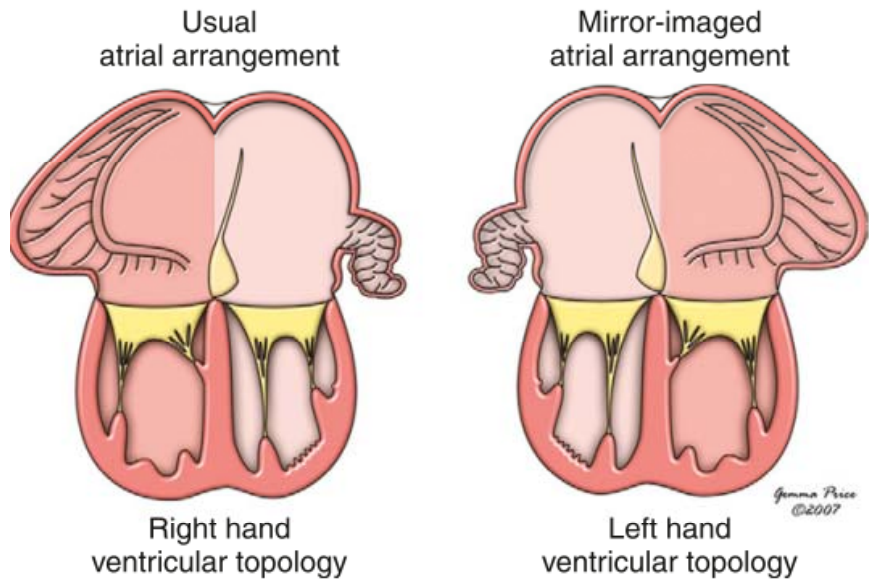
Atrioventricular connections

- Biventricular atrioventricular connections
- Univentricular atrioventricular connections

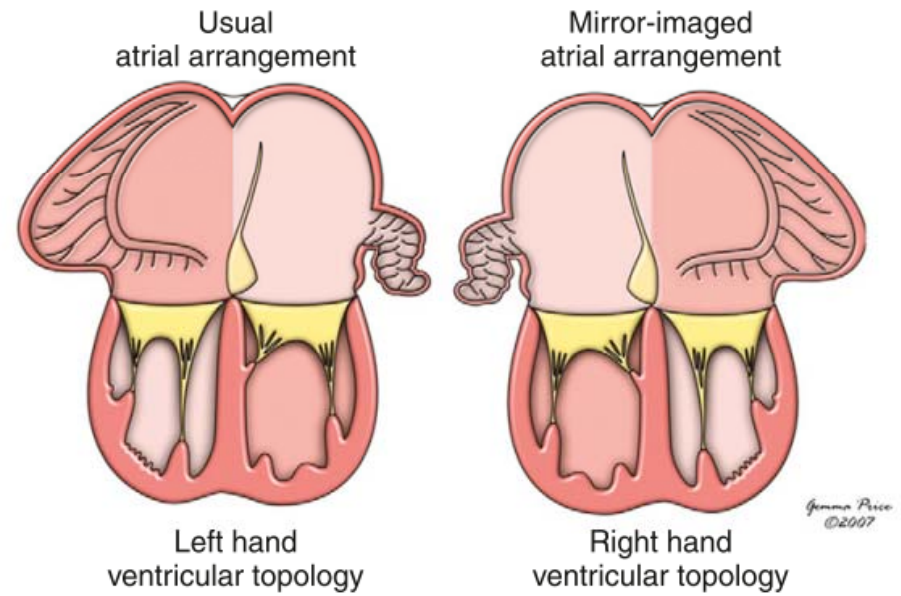
Atrioventricular connections

- Biventricular atrioventricular connections
 - Concordant
 - Discordant
 - Isomerism
- Univentricular atrioventricular connections

Concordant AV connections

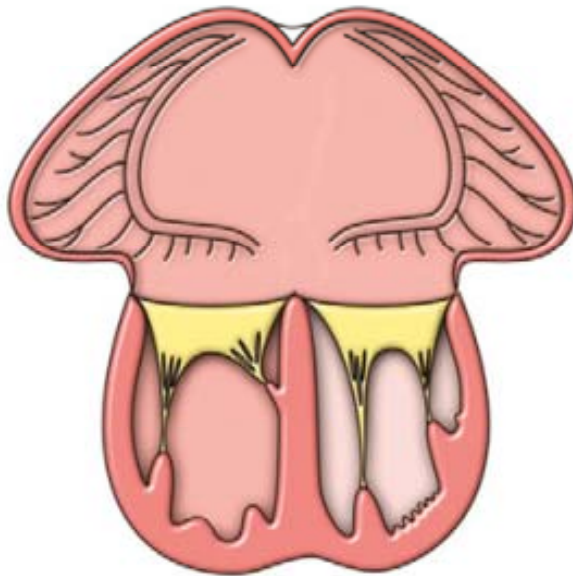


Discordant AV connections



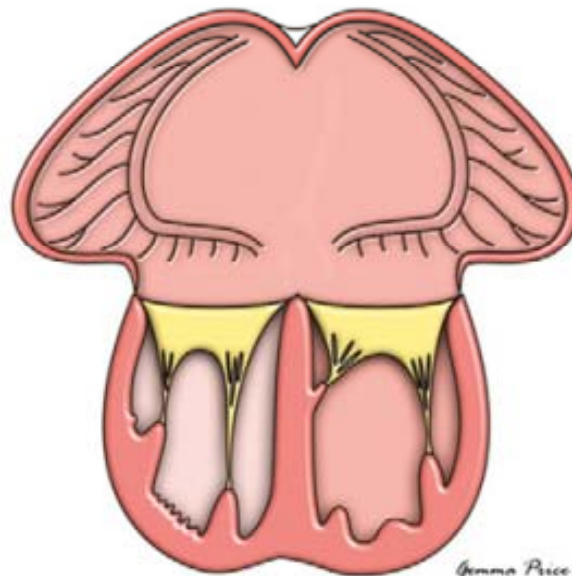
Biventricular AV connections with **isomerism** of the atrial appendages

Isomeric
right appendages



Right hand
ventricular topology

Isomeric
right appendages



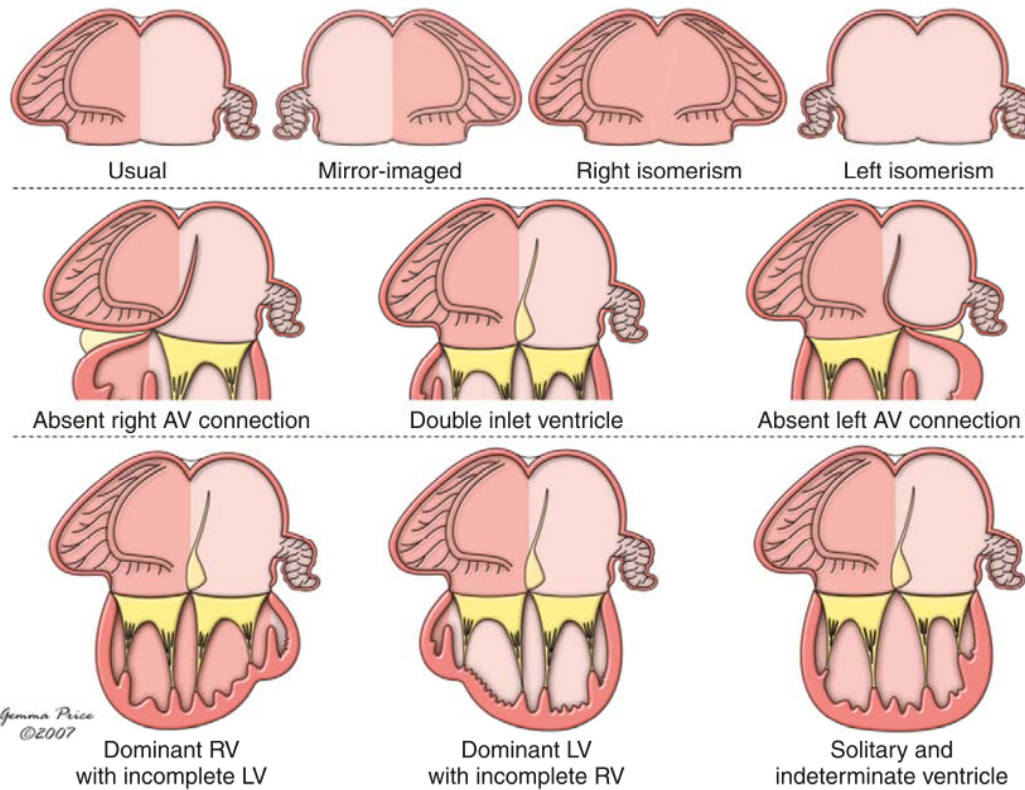
Left hand
ventricular topology

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Atrioventricular connections

- Biventricular atrioventricular connections
- Univentricular atrioventricular connections
 - Double inlet AV connections
 - Absent right-sided AV connection
 - Absent left-sided AV connection

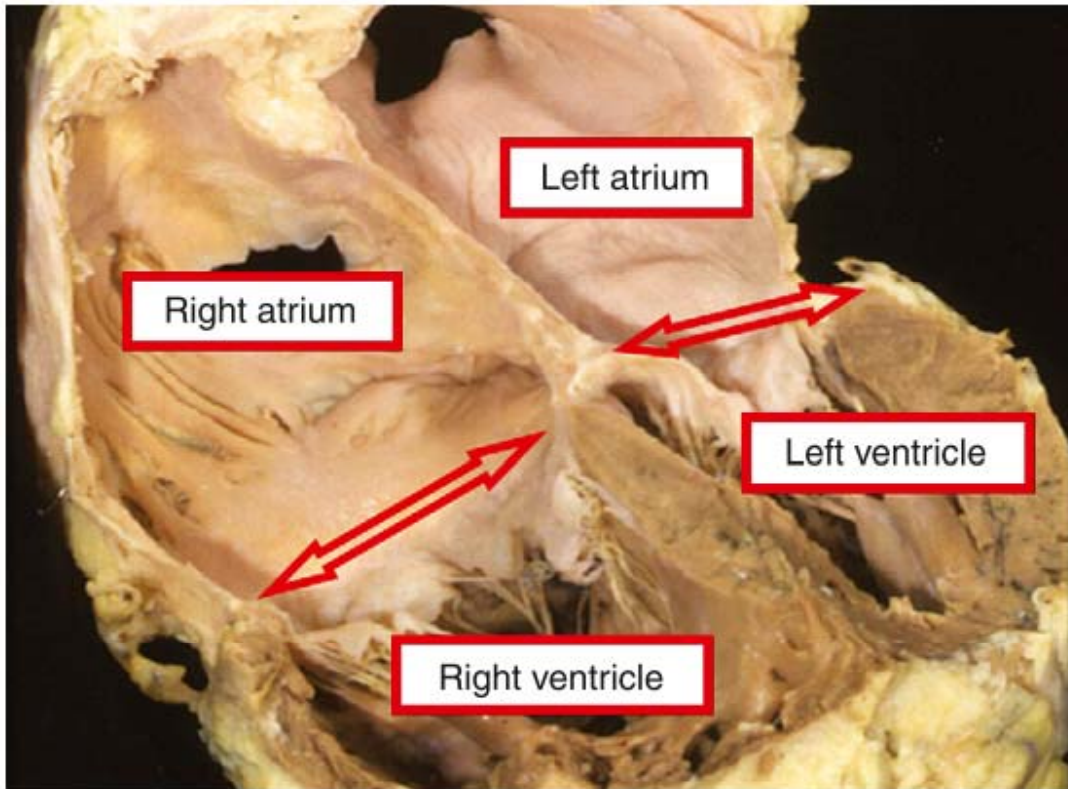
Univentricular AV connections



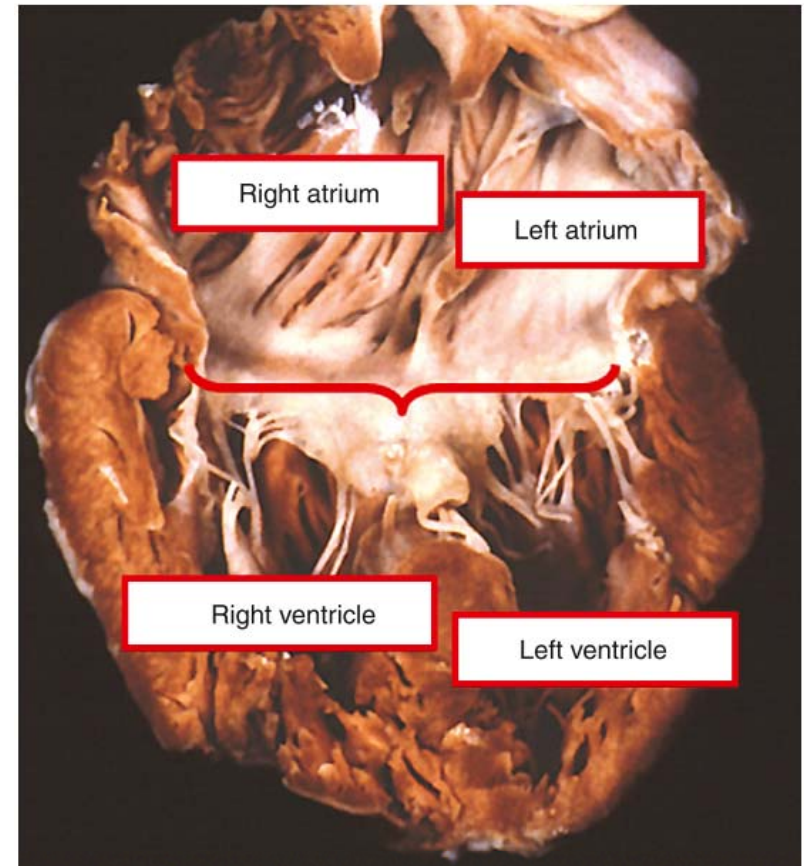
Arrangements of the AV valves

- Two patent valves
- A common valve
- One patent and one imperforate valve
- Straddling and overriding valves

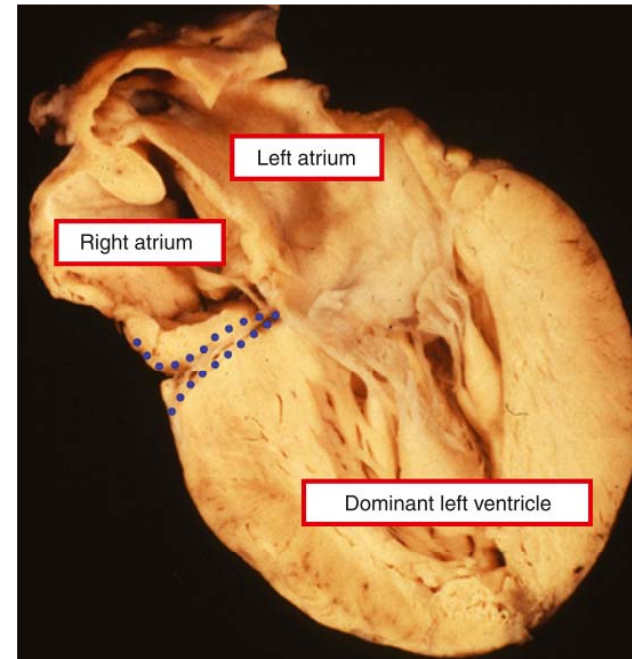
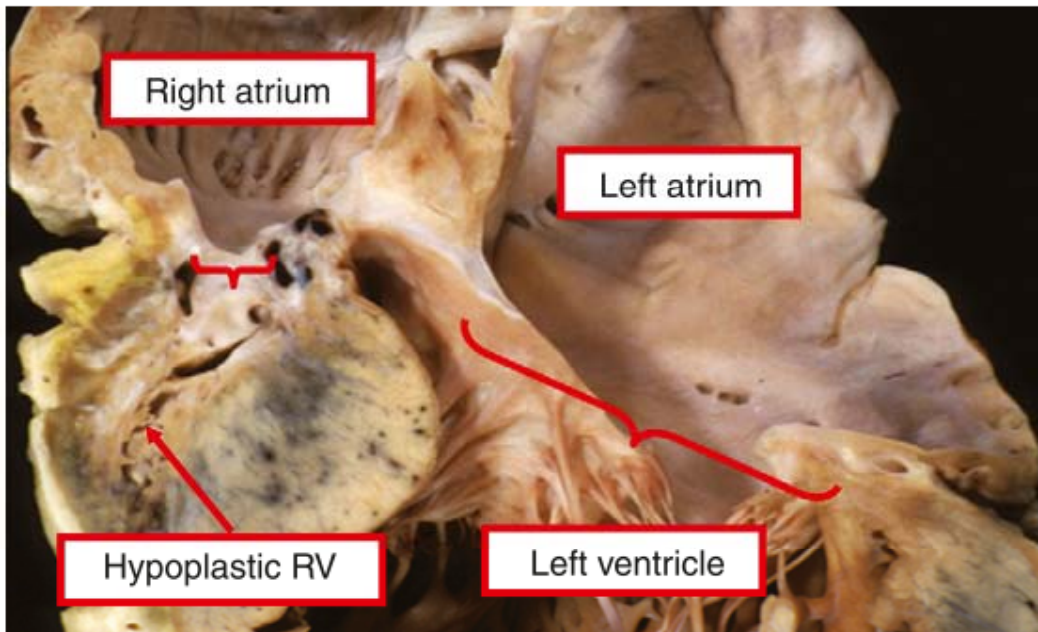
Two separate AV valves



Common AV valve



Imperforate right AV valve

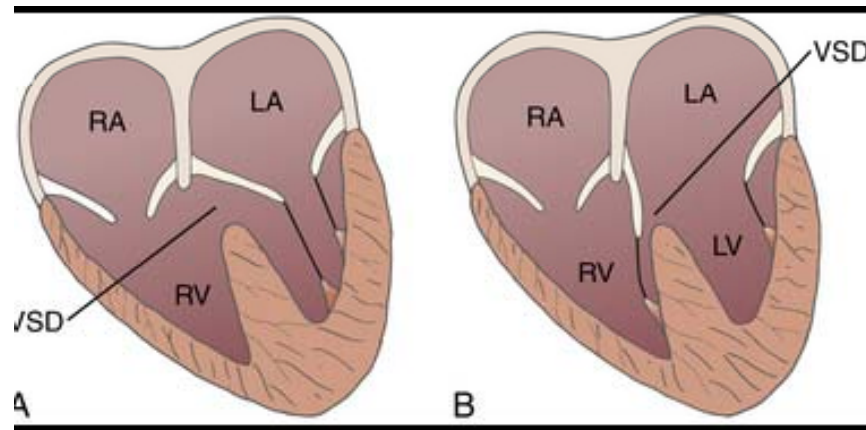


- **Straddling** of a AV valve

- Attachment of its tension apparatus to both sides of a septum within the ventricular mass

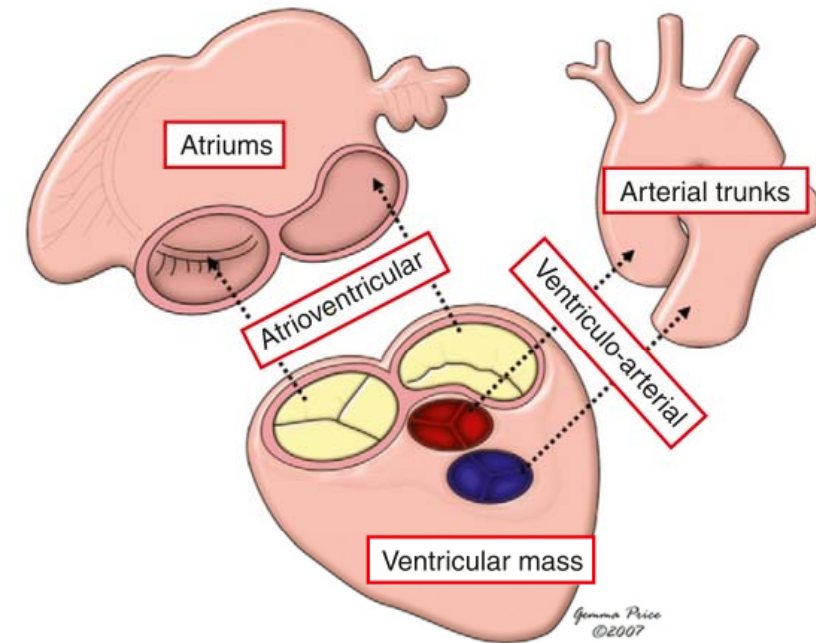
- **Overriding** of a AV valve

- Connection of an AV junction to ventricles on both sides of a septal structure



Steps !

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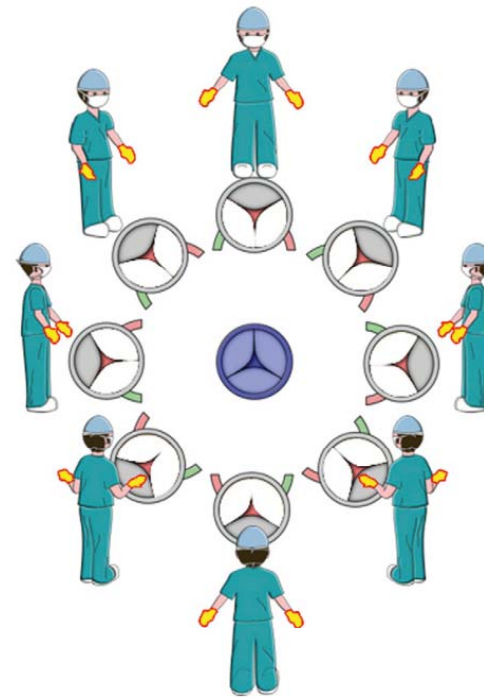
Ventriculo-Arterial Junctions

- Concordant VA connection
- Discordant VA connection
- Double outlet connection
- Single outlet connection
 - Common arterial trunk
 - Solitary arterial trunk
 - Single pulmonary trunk with aortic atresia
 - Single aortic trunk with pulmonary atresia

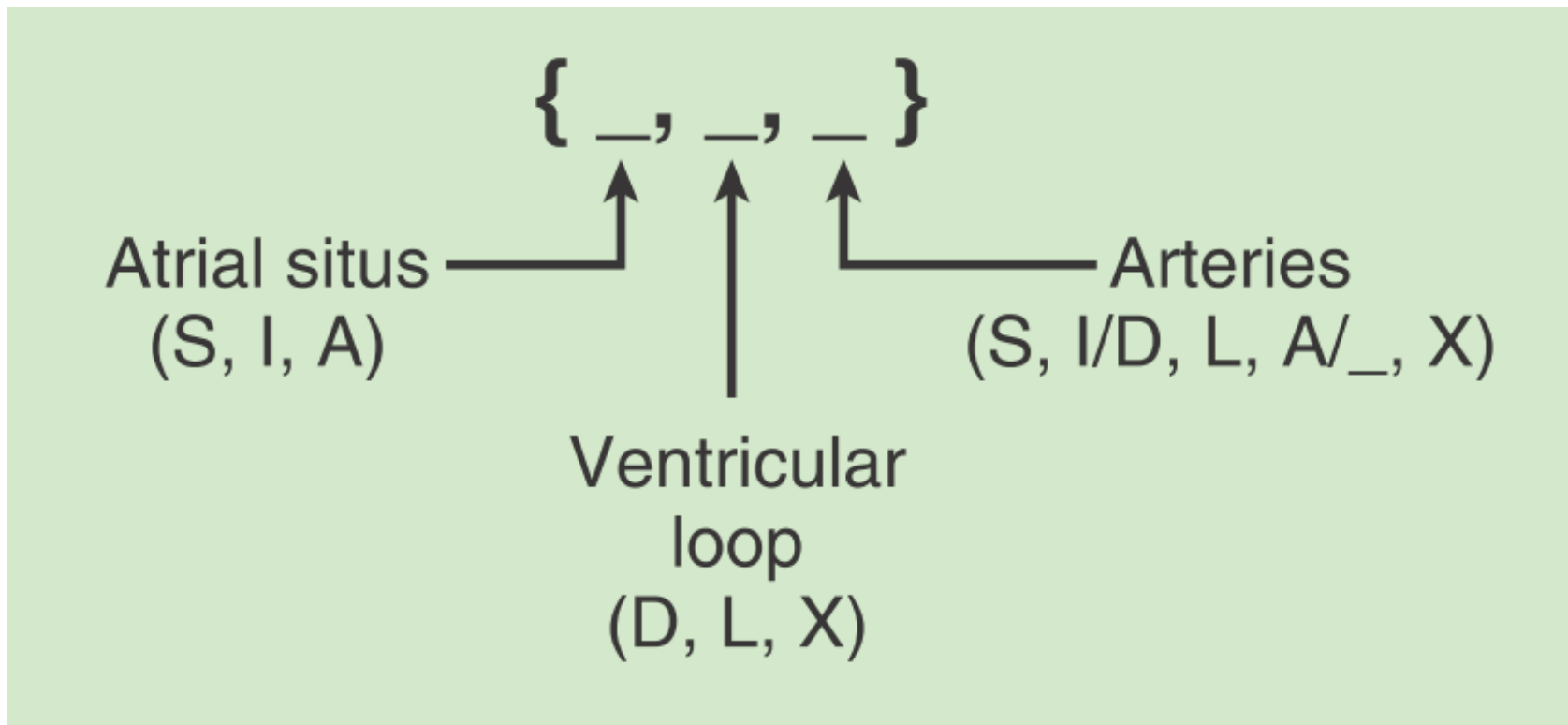
Arterial Relationships

- Description of aortic valvar position relative to the pulmonary valve

- Positions of arterial trunks
 - Spiral fashion
 - Parallel fashion



Segmental Set Notation



Steps !

- Arrangement of the atrial chambers : Solitus, Inversus, Ambiguous
- Nature of the atrioventricular junctions: Concordant, Discordant, Absent Rt./Lt.
- Arrangement of the ventricular chambers: Right/Left handed topology
- Nature of the ventriculo-arterial junctions:
Concordant/Discordant/Aortic/Pulmonary atresia
- Relationships of the arterial trunks

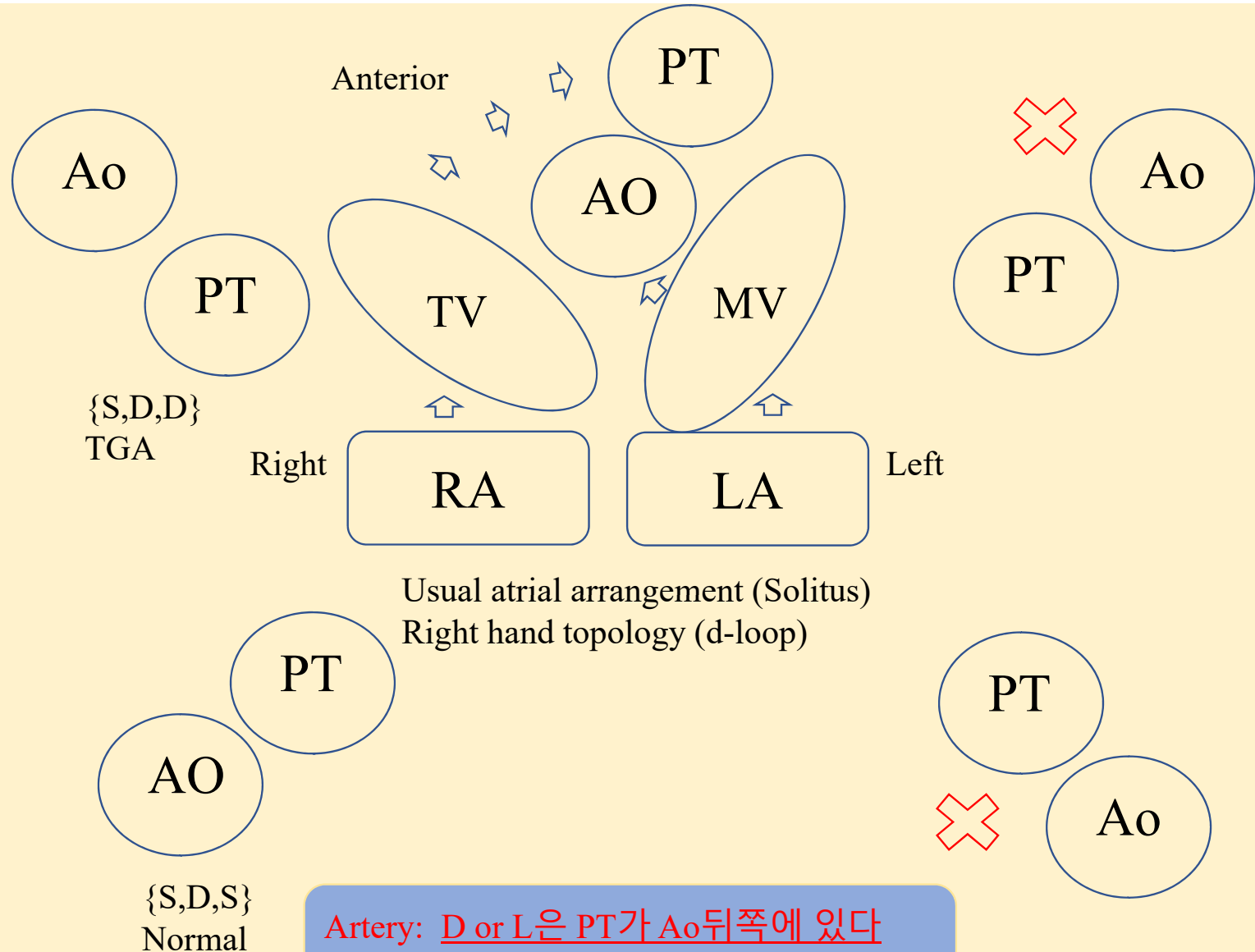
Examples

- {S,D,S}

- {S,D,D}

- {S,L,L}

- {I,D,D}



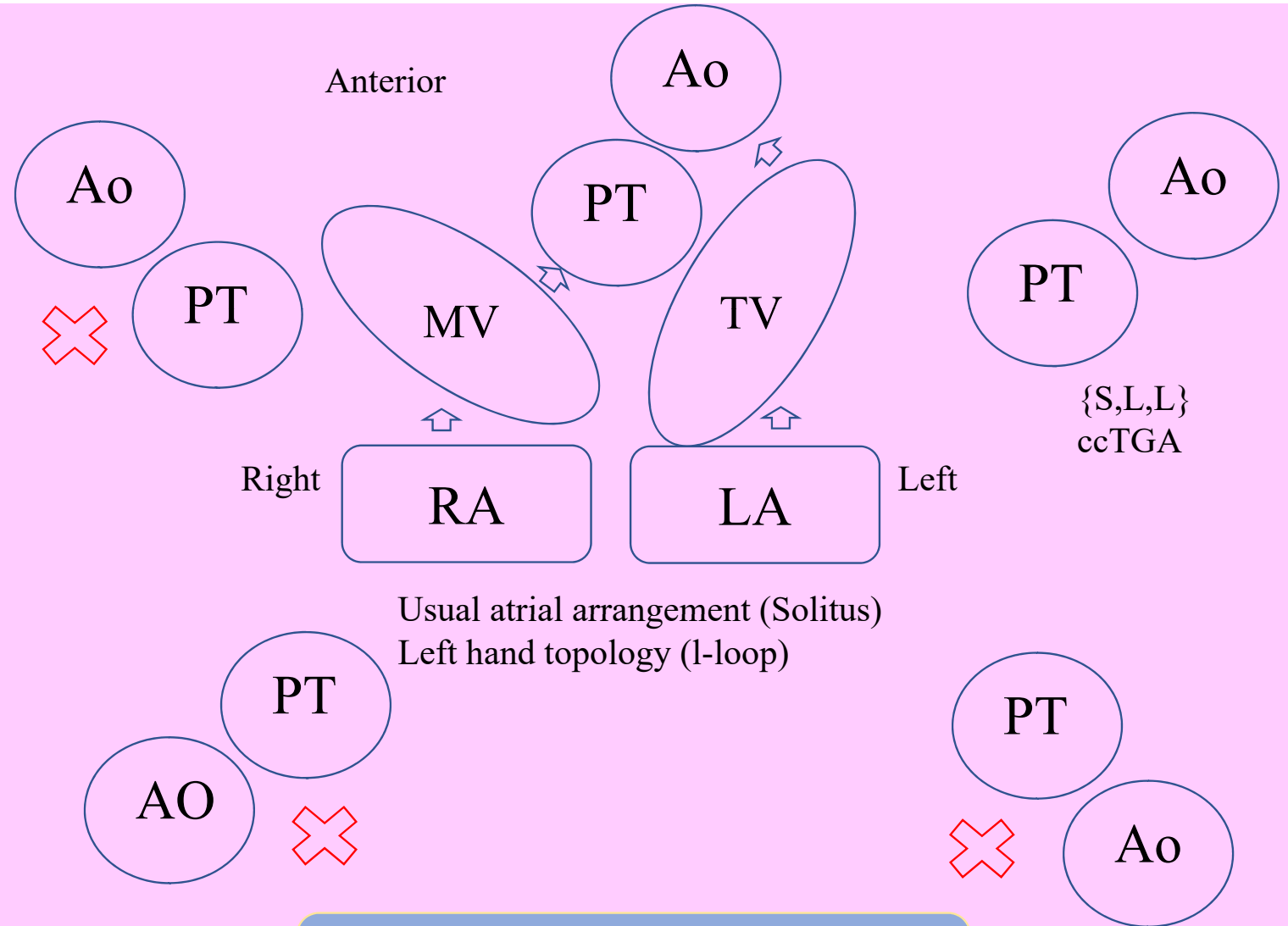
Examples

- {S,D,S}

- {S,D,D}

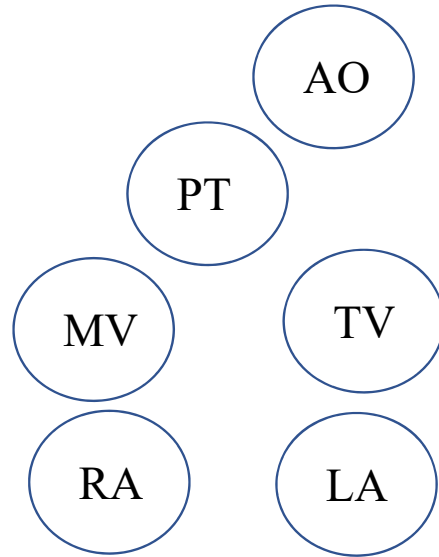
- {S,L,L}

- {I,D,D}

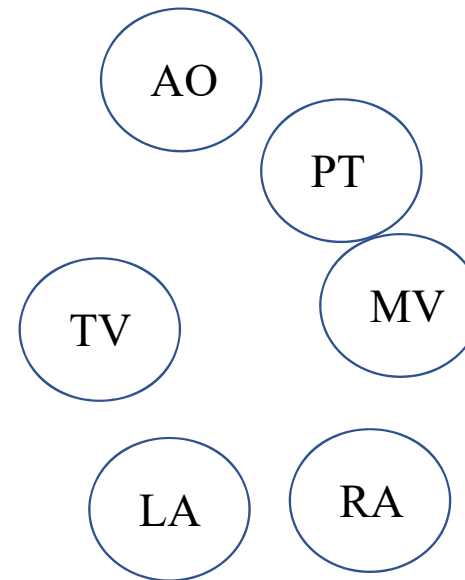


Artery: D or L은 PT가 Ao뒤쪽에 있다
S or I는 PT가 Ao앞쪽에 있다.

- ccTGA {S,L,L}, {I,D,D}



{S,L,L}



{I,D,D}

References

- Chapter 1. Terminology. In: Anderson RH, et al. Paediatric Cardiology. 3rd ed.
- Chapter 2. Anatomy. In: Anderson RH, et al. Paediatric Cardiology. 3rd ed.
- Chapter 105. Segmental Anatomy. In: Selke FW, et al. Sabiston & Spencer Surgery of the Chest. 9th ed.