대한흉부심장혈관외과학회 제11차 전공의 연수교육
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Sequential Segmental Analysis

Cheul Lee, MD

Pediatric Cardiac Surgery

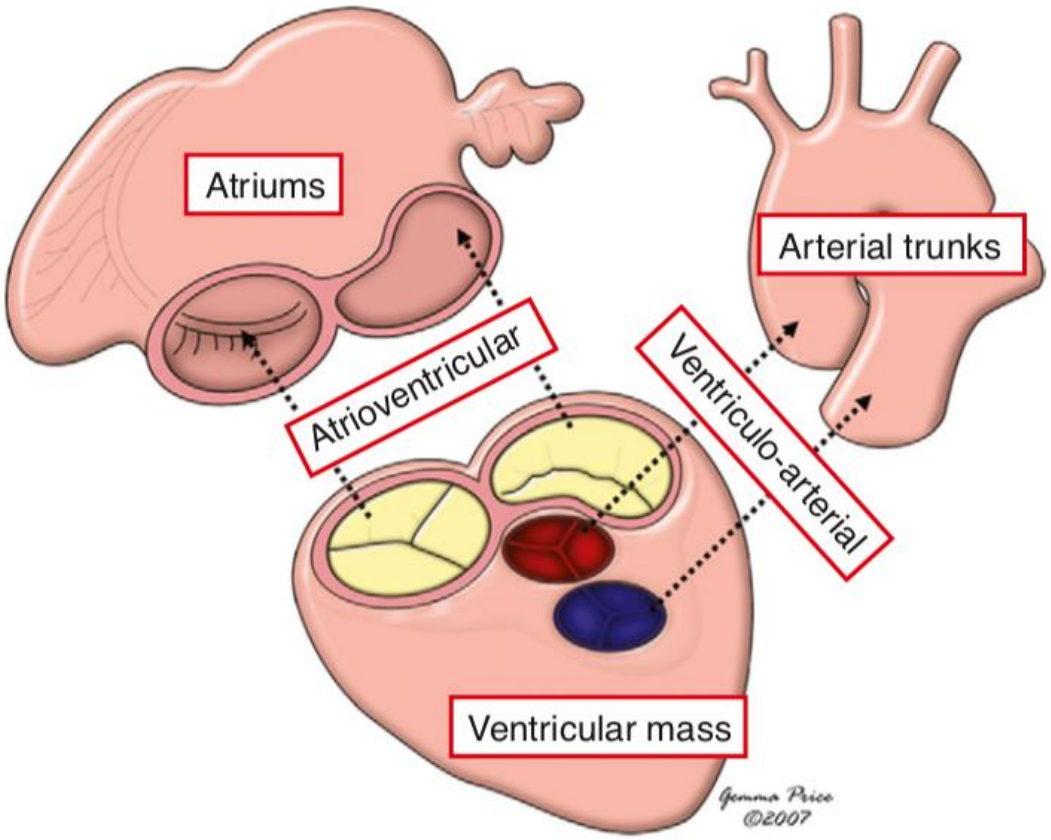
Seoul St. Mary's Hospital

College of Medicine, The Catholic University of Korea

Congenitally Malformed Hearts

- We need the most appropriate way of describing the malformations.
- Approach to complex lesions in a simple and straightforward fashion
- Terminology
- Nomenclature

Three Building Blocks (Segments) of the Heart



Anderson RH, et al. Paediatric Cardiology. 3rd ed.

Sequential Segmental Analysis

- Recognition of the topological arrangement of the three cardiac segments

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

Steps for Sequential Segmental Analysis

- 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

A Premise for Sequential Segmental Analysis

- The ability to distinguish the morphology of the individual atriums and ventricles, and to recognize the types of arterial trunk taking origin from the ventricles

What is right atrium?

- The atrium located at the right side?
- The atrium connected to the caval veins?
- The atrium connected to the TV?

Morphological Method

- Structures should be recognized in terms of their own intrinsic morphology.

- One part of the heart which is itself variable should not be defined on the basis of another variable structure.

Atrial Appendage

- The most reliable component of atrium which enables us to distinguish between morphologically right and left atriums

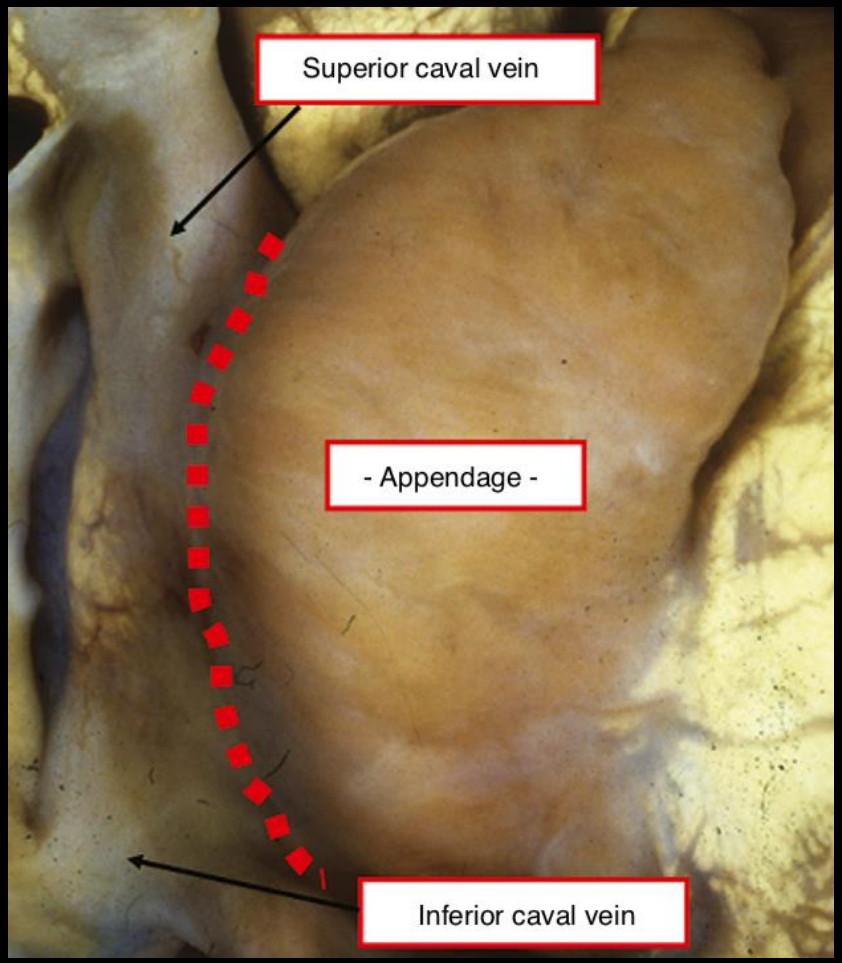
Morphological Right Appendage

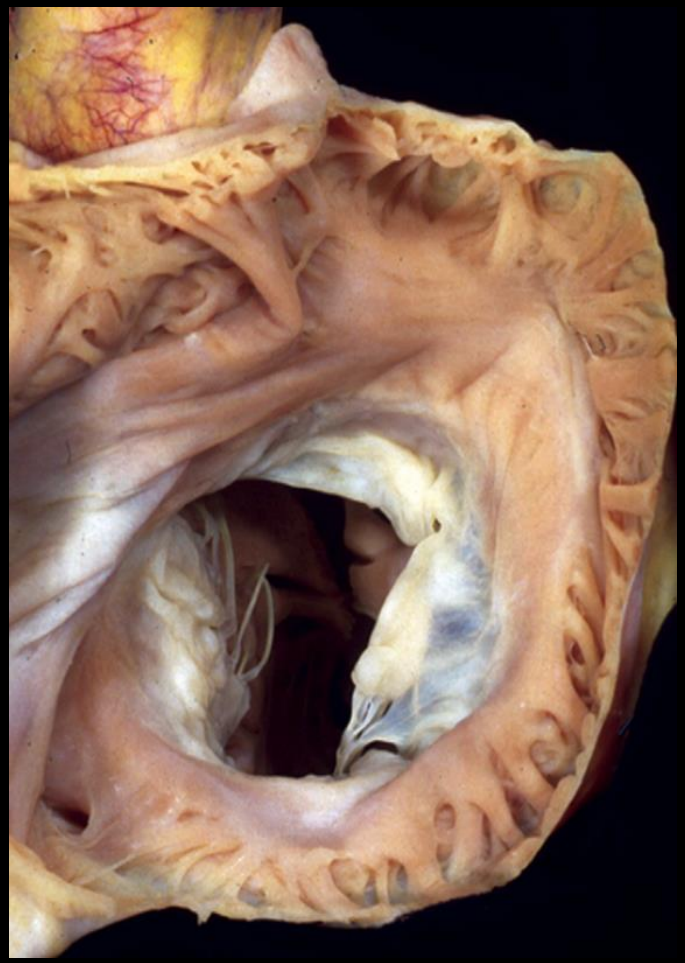
- Blunt triangular shape

- Broad junction with the remainder of the atrium
  - ✓ External junction: terminal groove (sulcus terminalis)
  - ✓ Internal junction: terminal crest (crista terminalis)

- Extension of the pectinate muscles lining the appendage all round the atrioventricular junction

Morphological RA



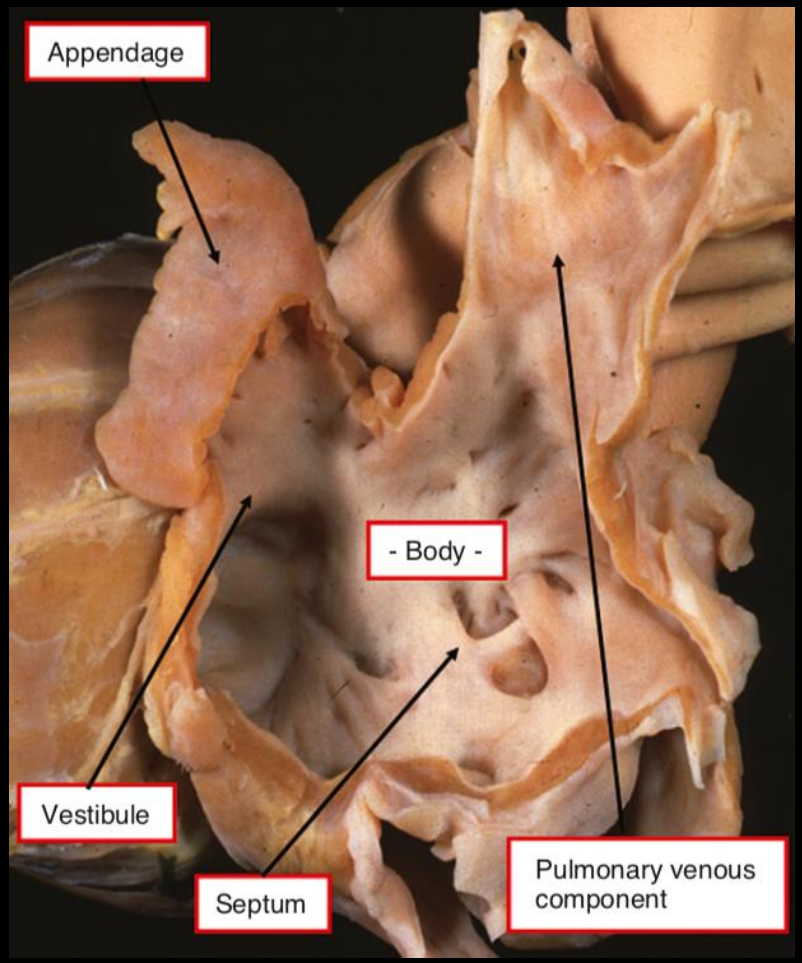


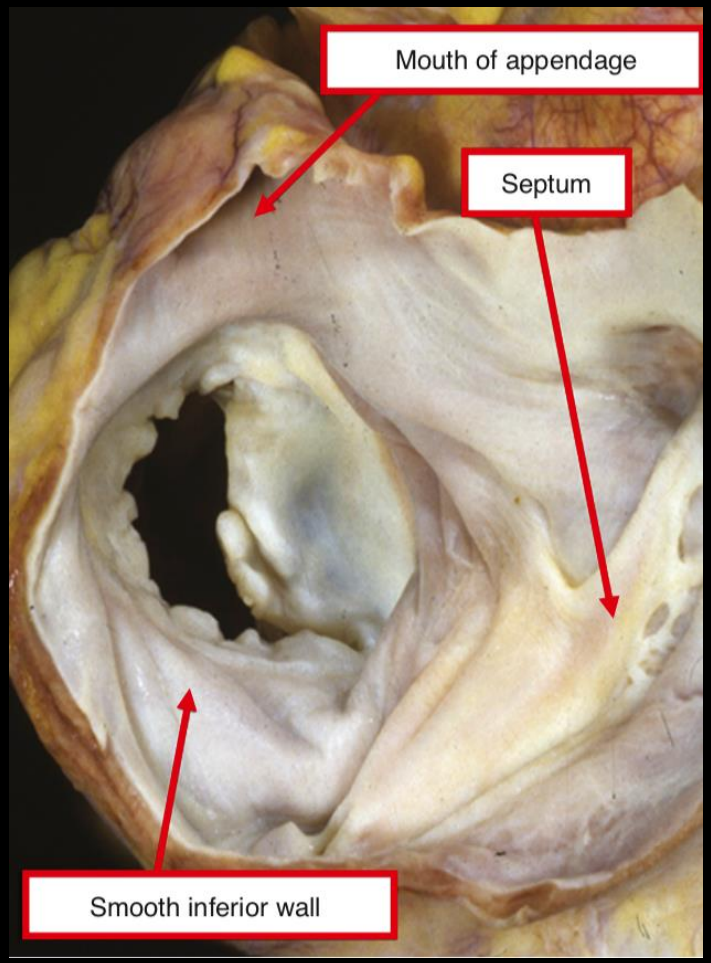
Anderson RH, et al. Paediatric Cardiology. 3rd ed.

Morphological Left Appendage

- Narrow and tubular shape
- Narrow junction with the remainder of the atrium
  - ✓ No terminal groove or terminal crest
- Confinement of the pectinate muscles within the morphological left appendage

Morphological LA





Anderson RH, et al. Paediatric Cardiology. 3rd ed.

Three Components of Ventricle

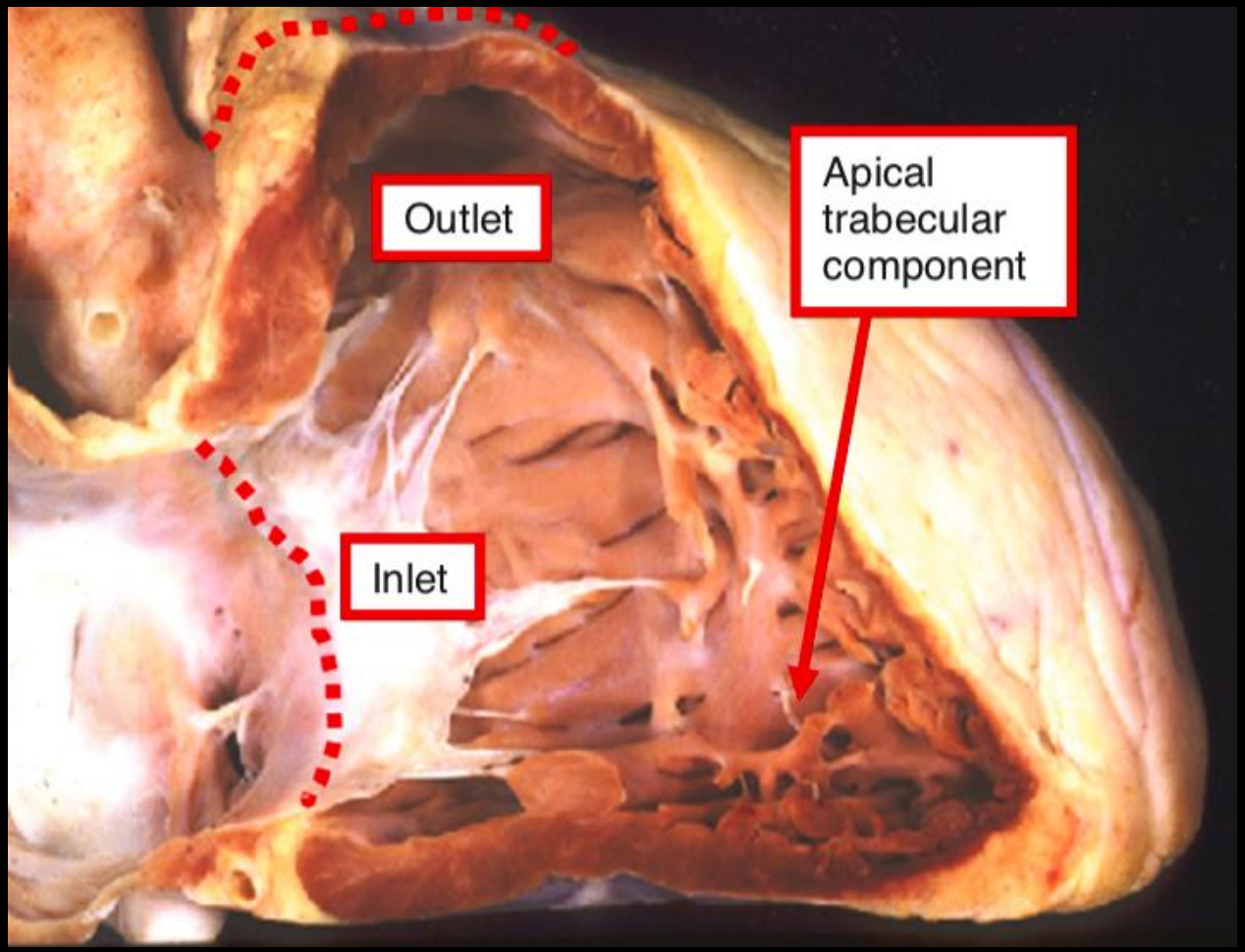
- Inlet
- Apical trabecular
- Outlet

Apical Trabecular Component

- Most universally present in normal as well as in malformed and incomplete ventricles

- It is the pattern of the apical trabeculations that differentiates morphologically right from left ventricles.

Morphological RV



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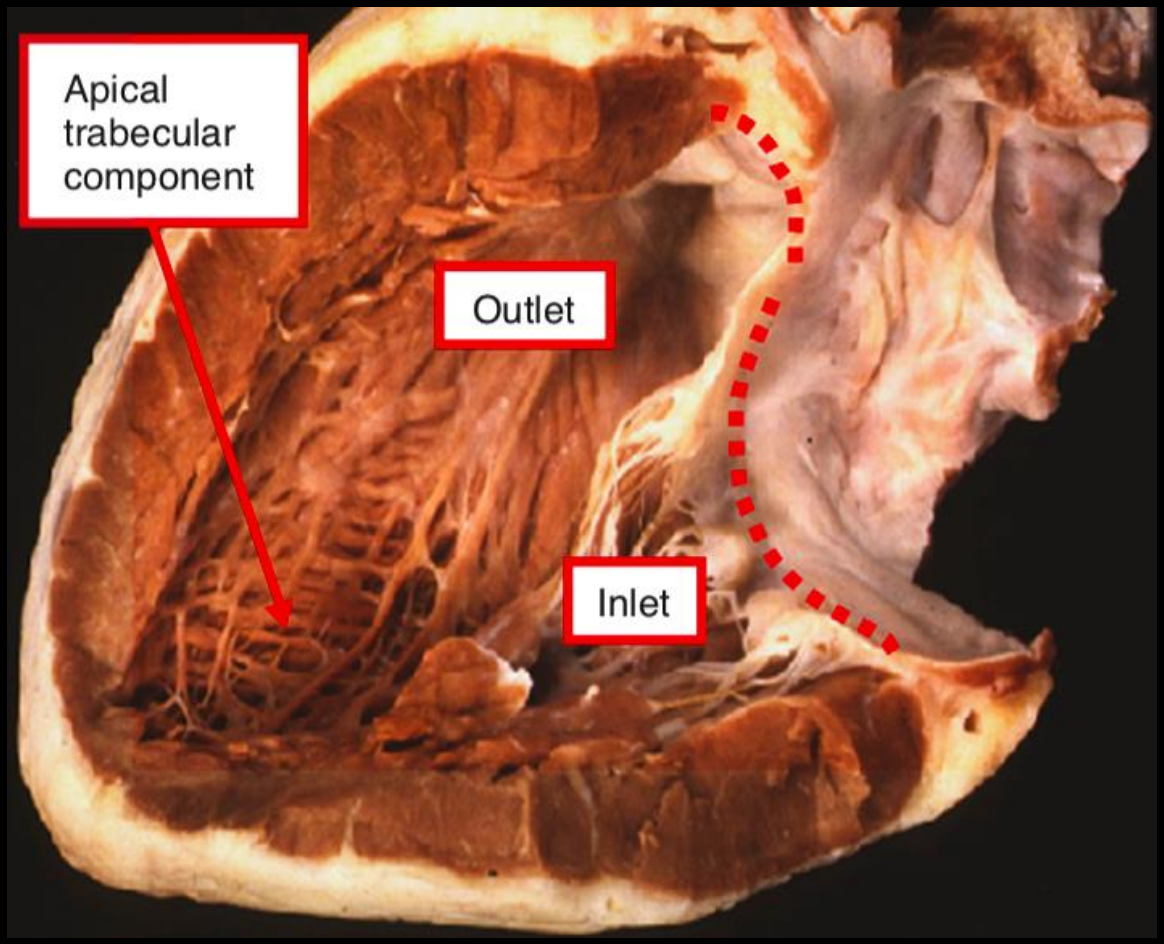
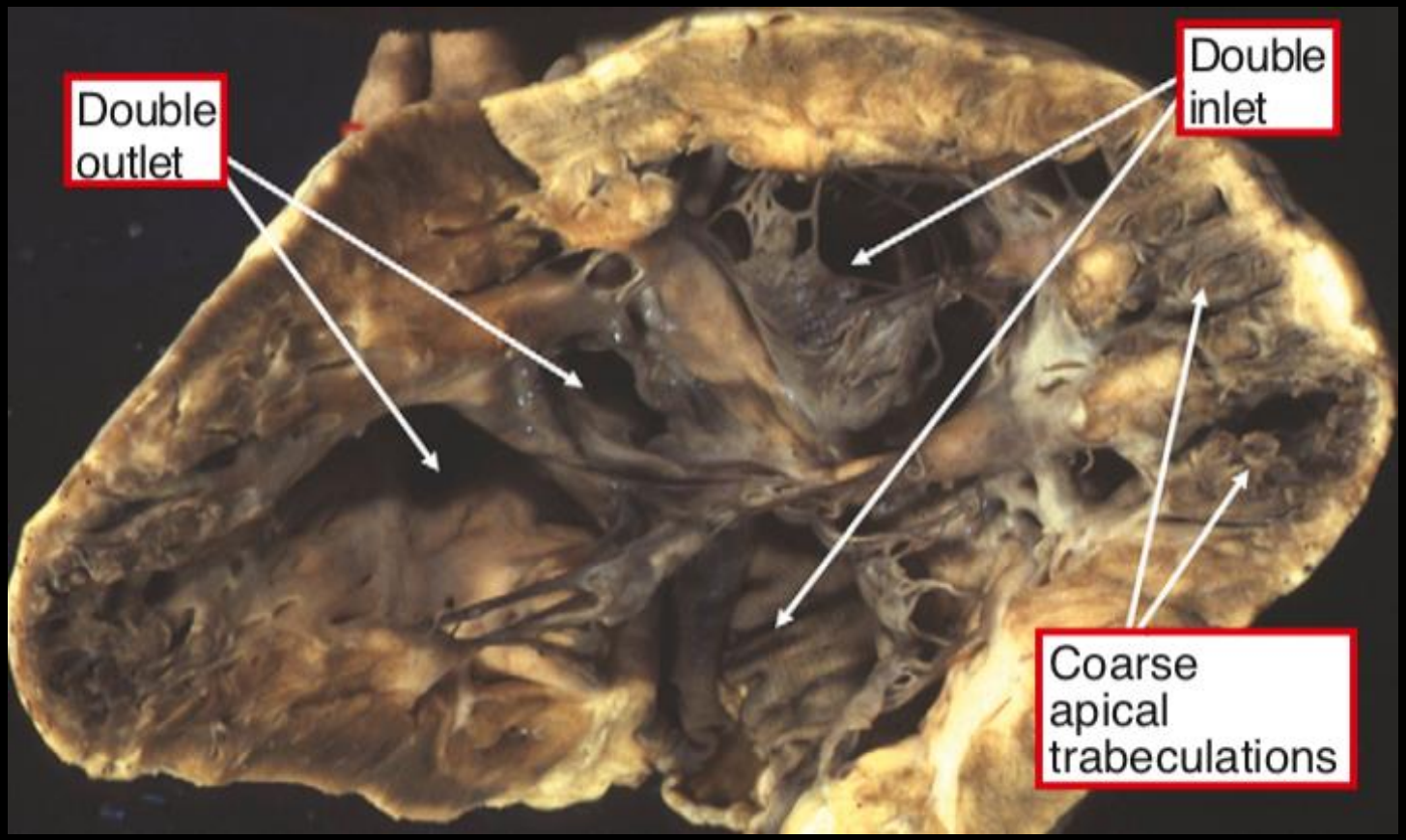
Morphological LV



Anderson RH, et al. Paediatric Cardiology. 3rd ed.

A Solitary Ventricle
With an Indeterminate Morphology



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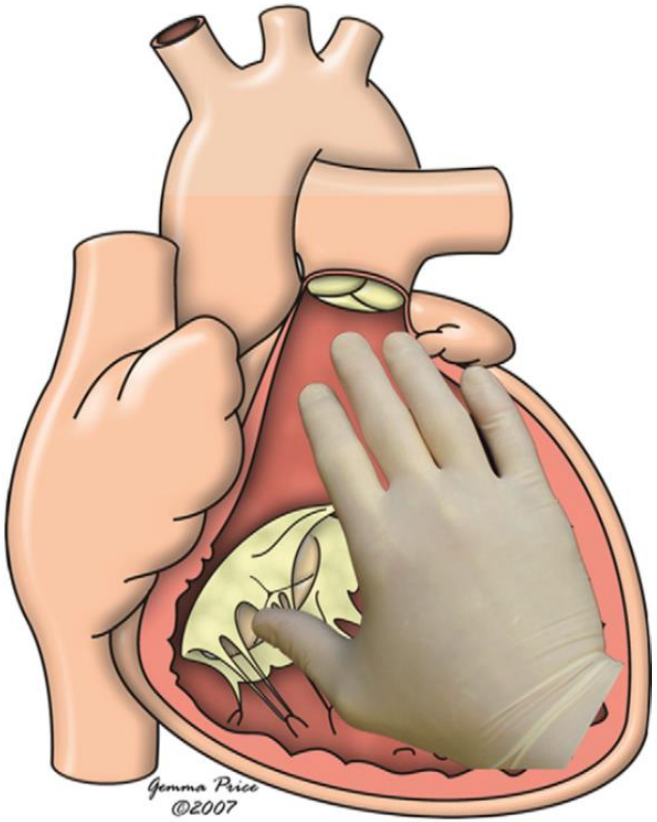
Ventricular Topology

- The way in which the two ventricles are related within the ventricular mass

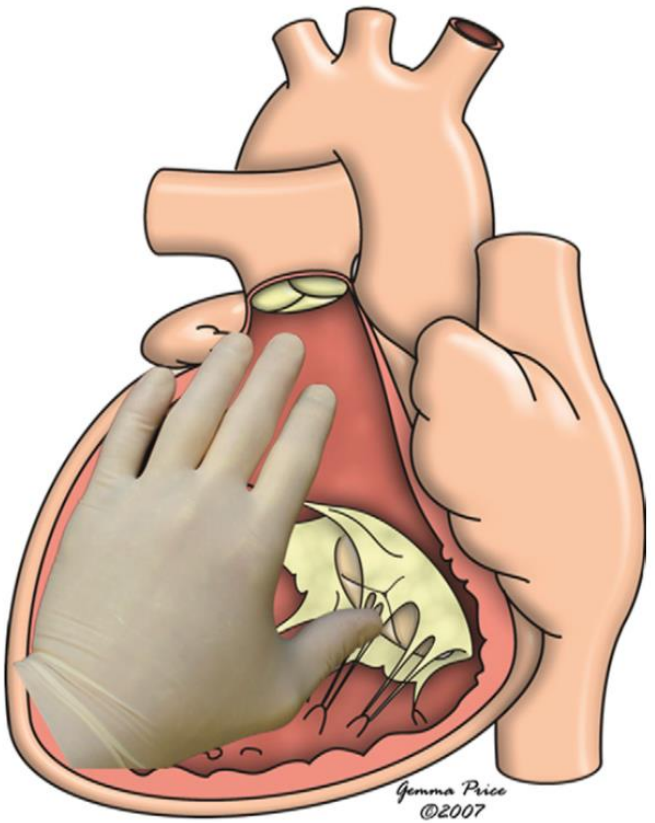
- Two basic patterns
  - ✓ D-ventricular loop
  - ✓ L-ventricular loop

Ventricular Topology

D-ventricular loop



L-ventricular loop



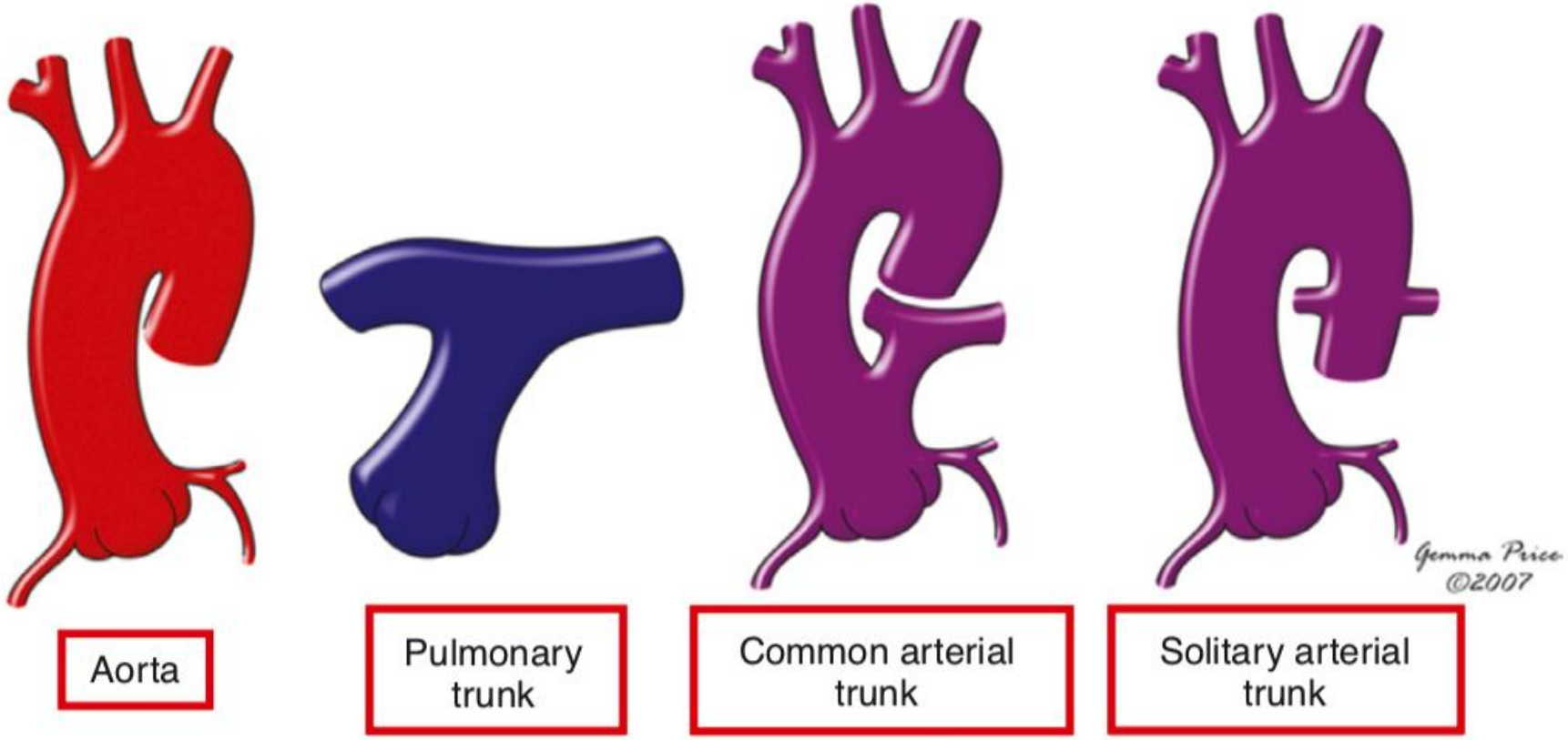
Anderson RH, et al. Paediatric Cardiology. 3rd ed.

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

Branching Pattern of Arterial Trunks



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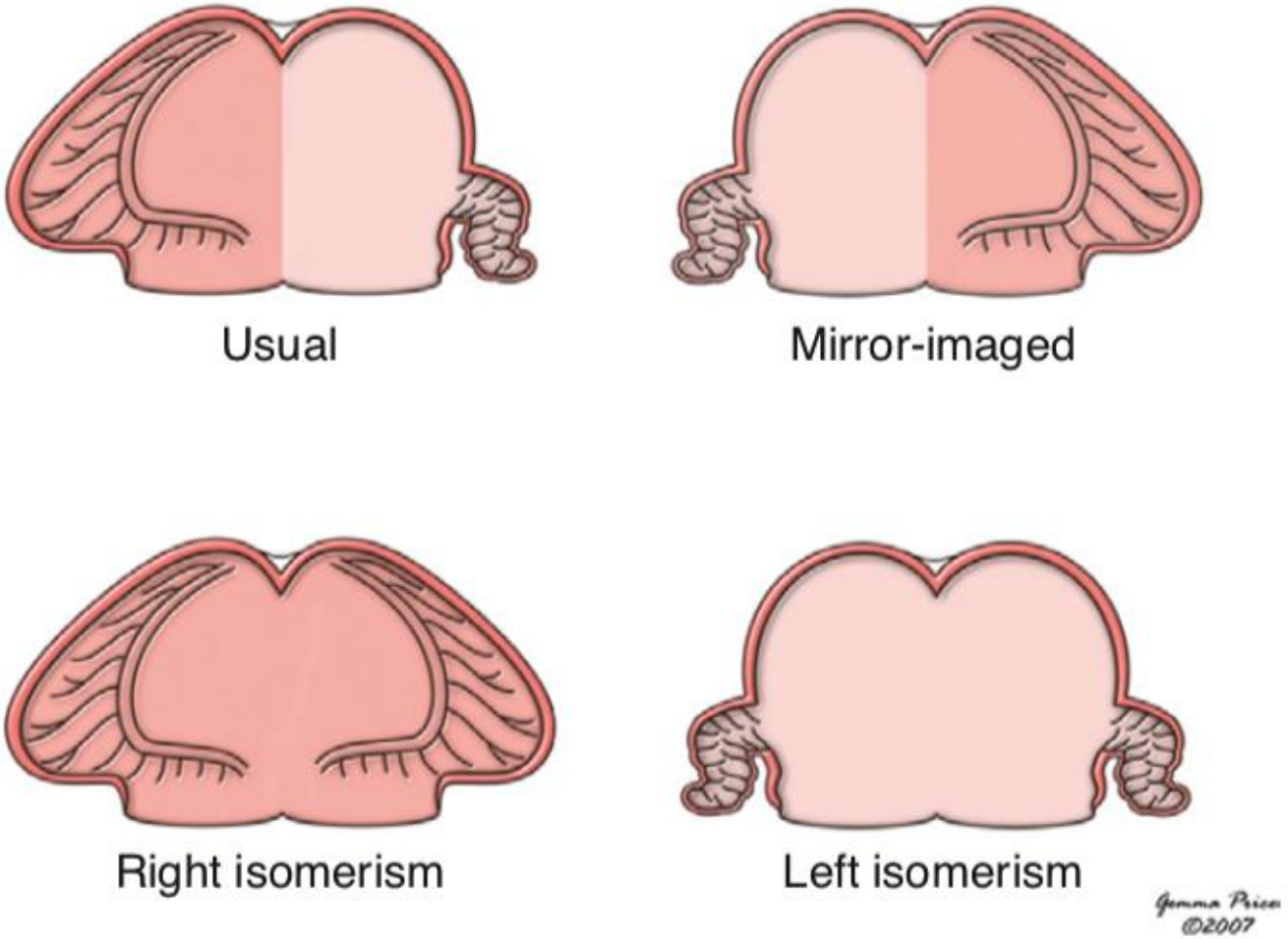
Atrial Arrangement

- Situs solitus
- Situs inversus
- Isomerism of the atrial appendages

Atrial Arrangement



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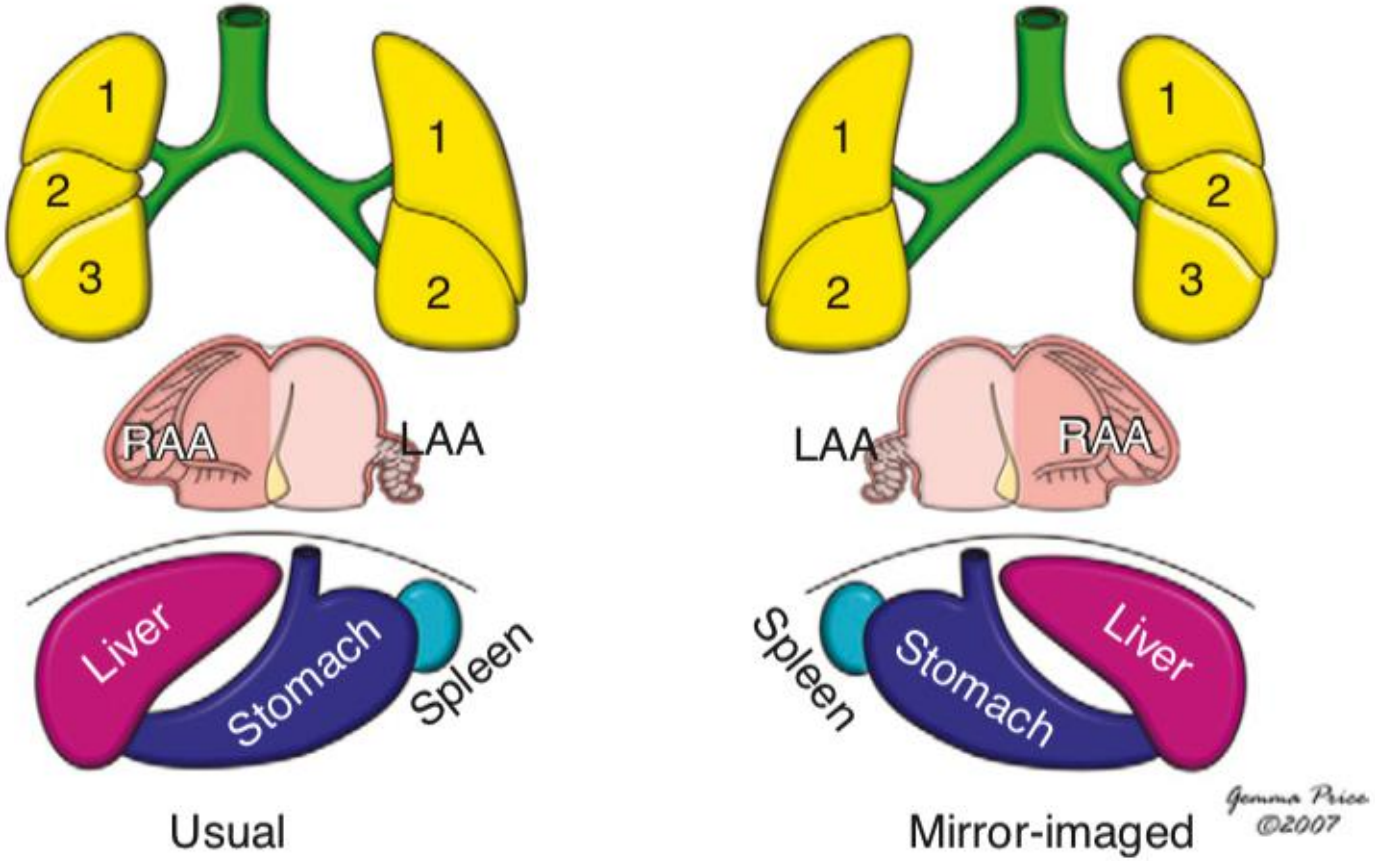
Recognition of Atrial Arrangement

- Extent of the pectinate muscles round the vestibules
- Almost always, the morphology of the appendages is in harmony with the arrangements of the thoracic and abdominal organs.
- In patients with usual and mirror imaged patterns, it is exceedingly rare for there to be disharmony between the location of the organs.

Lateralized Atrial Arrangements



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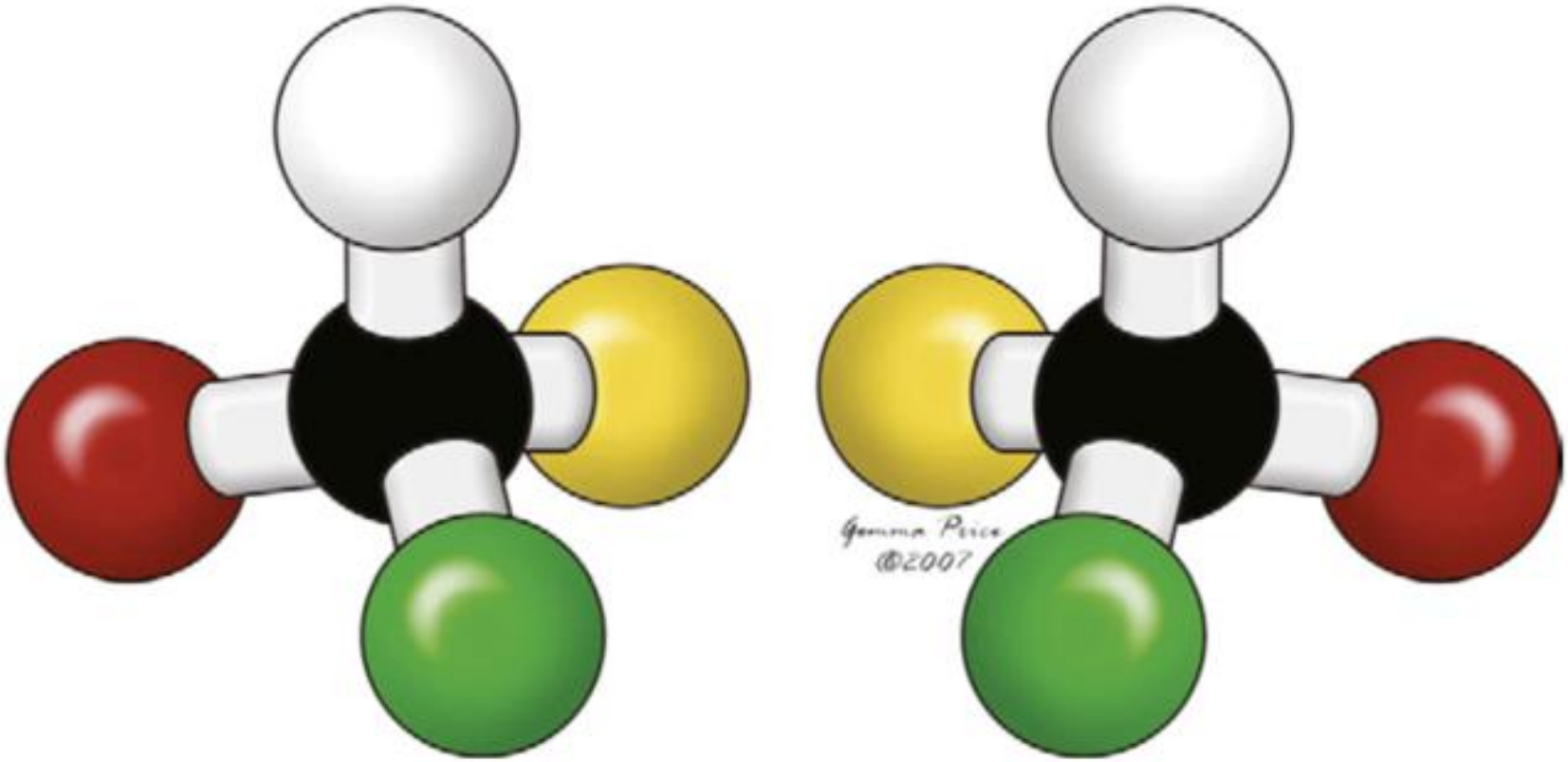
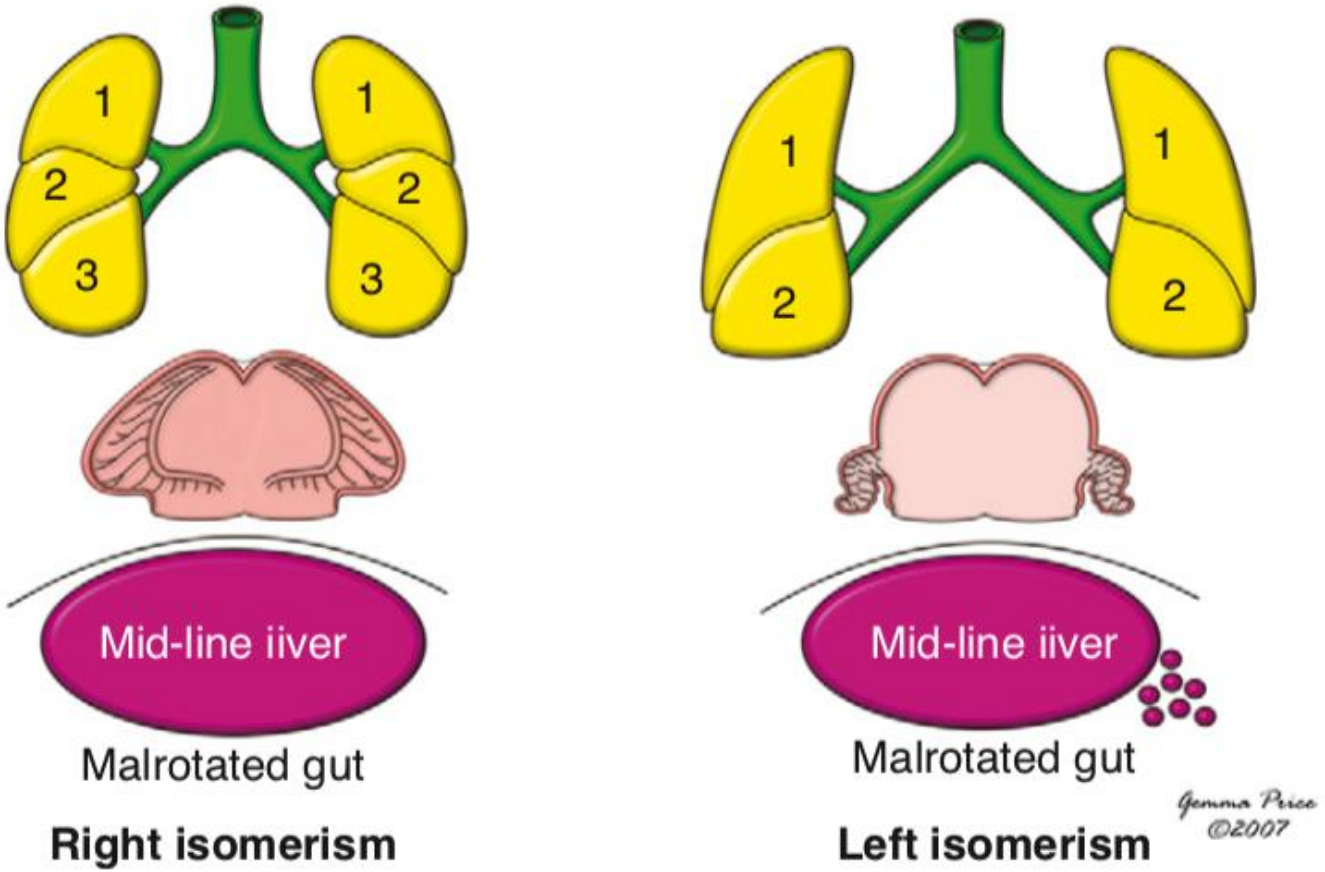
Isomerism



Anderson RH, et al. Paediatric Cardiology. 3rd ed.

Isomerism of the Atrial Appendages (Visceral Heterotaxy)



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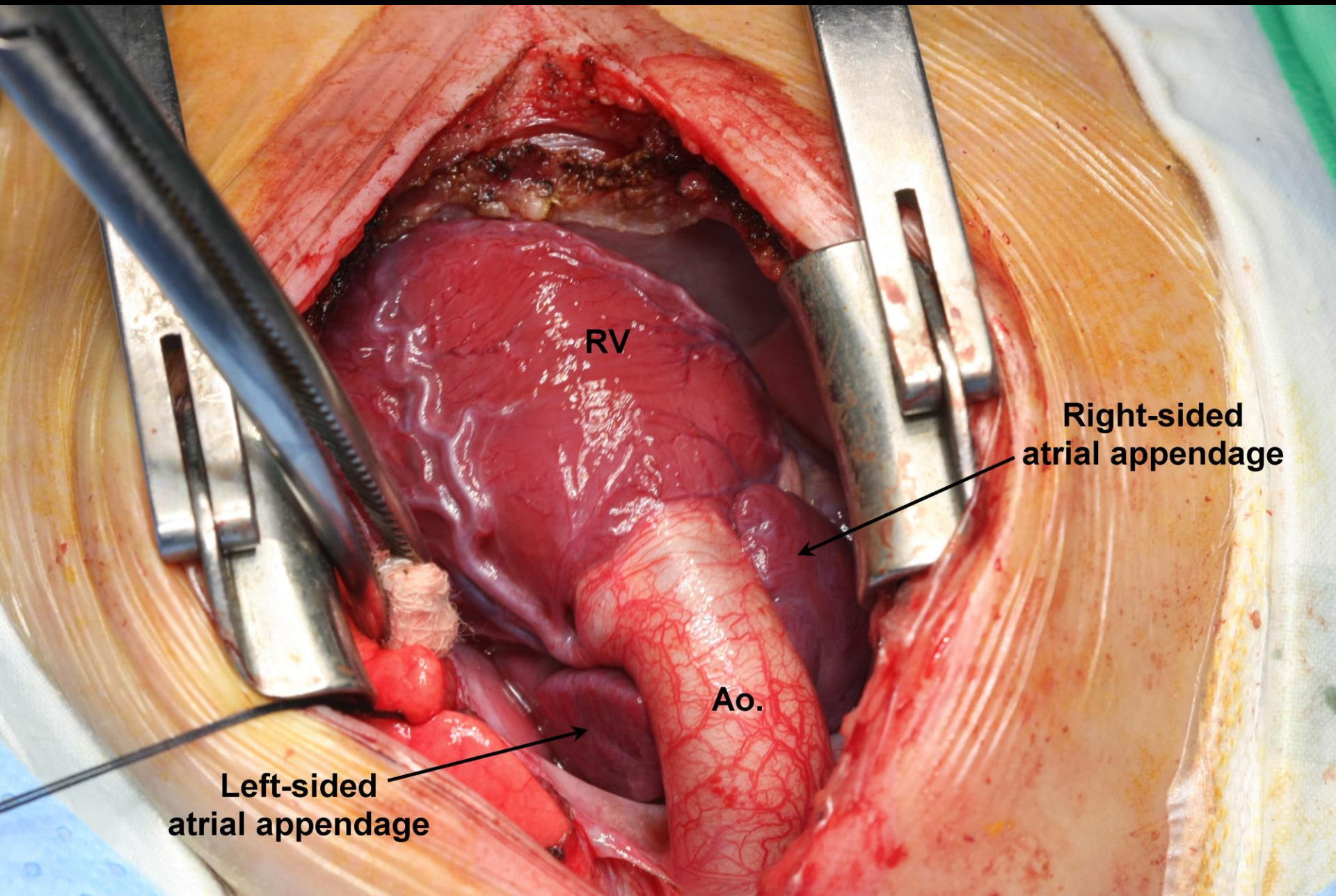
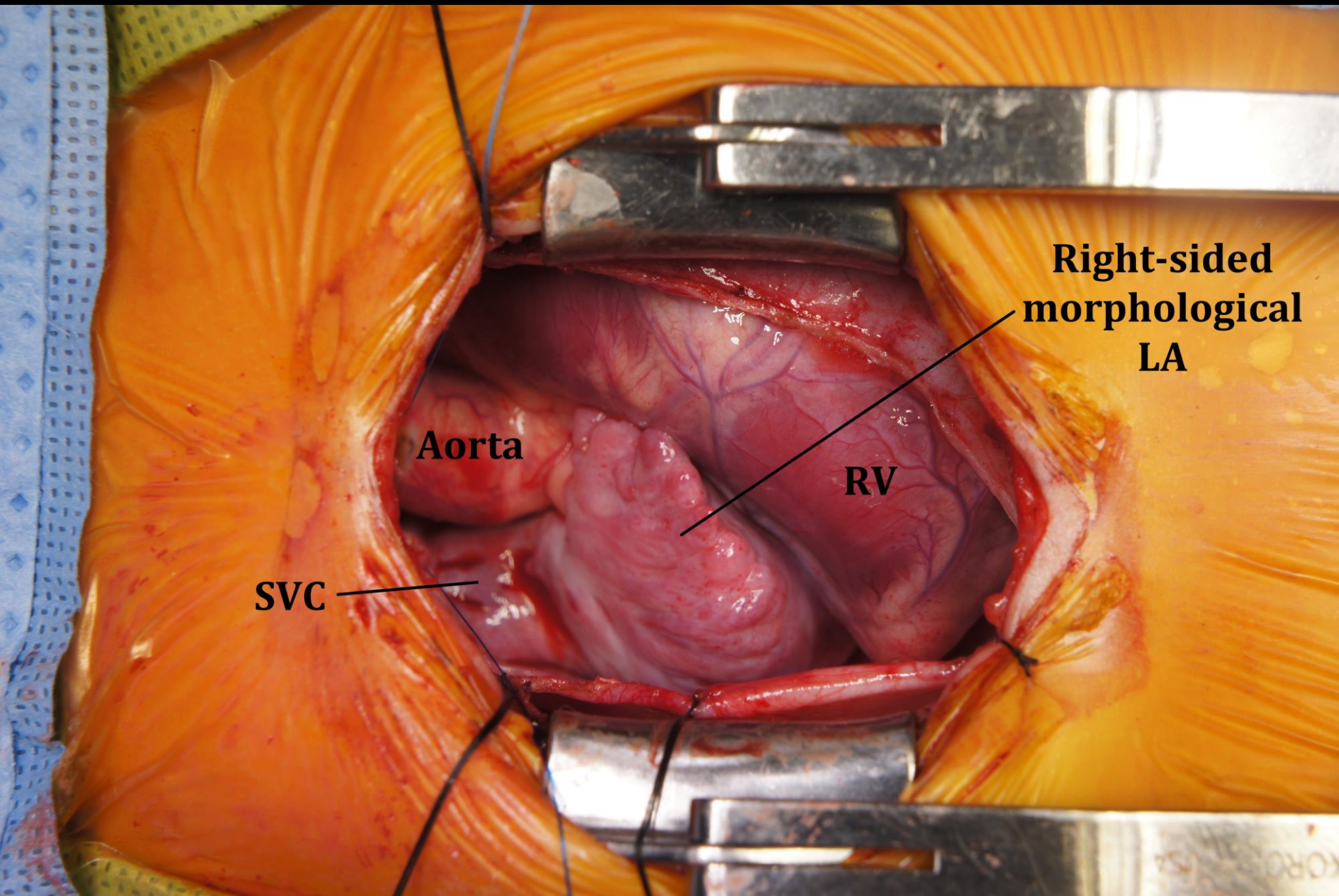
Isomerism of the Right Atrial Appendages



Isomerism of the Left Atrial Appendages



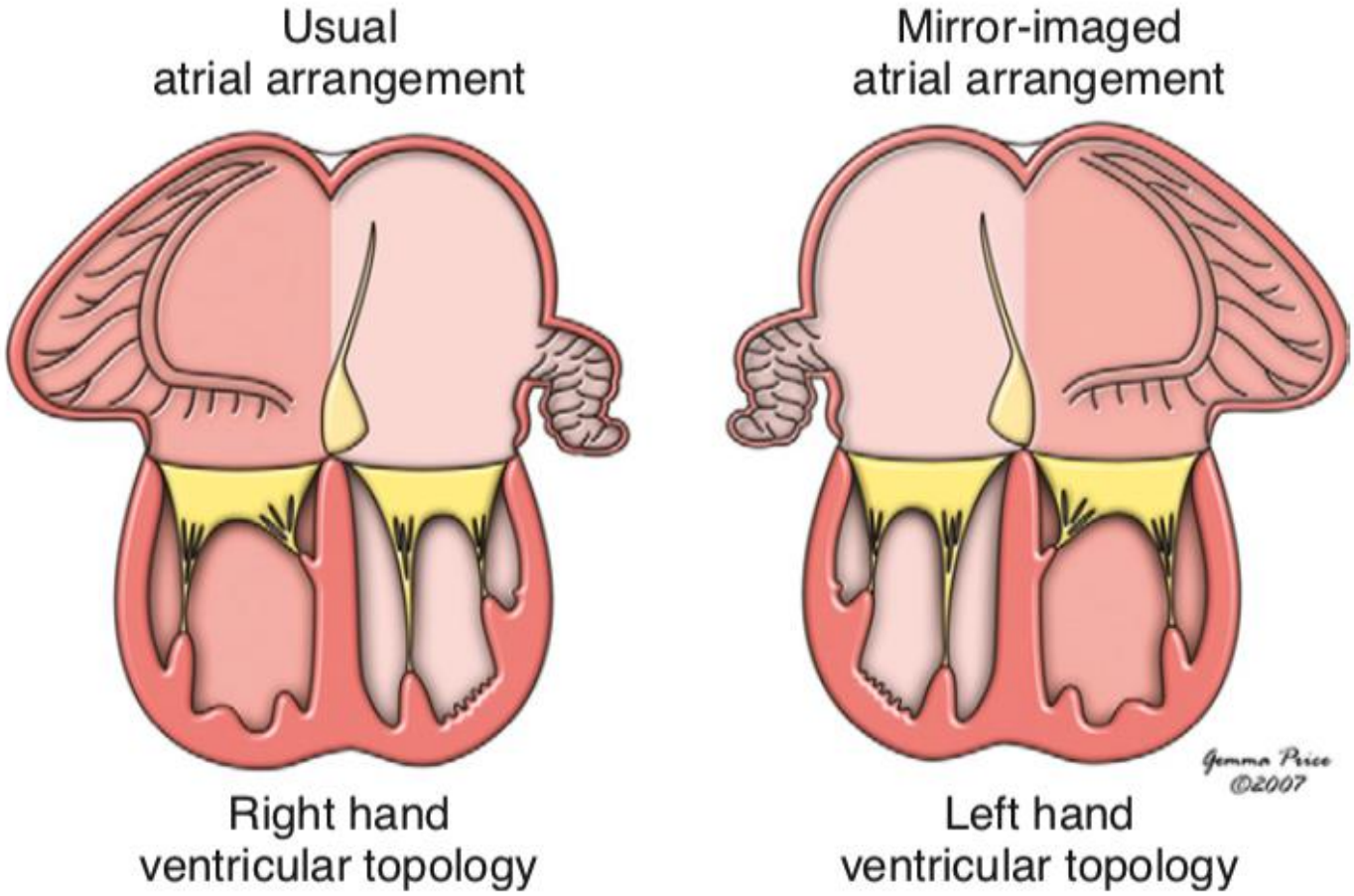
Atrioventricular Connections

- Biventricular atrioventricular connections
- Univentricular atrioventricular connections

Biventricular Atrioventricular Connections

- Concordant atrioventricular connections
- Discordant atrioventricular connections
- Isomerism of the atrial appendages

Concordant Atrioventricular Connections



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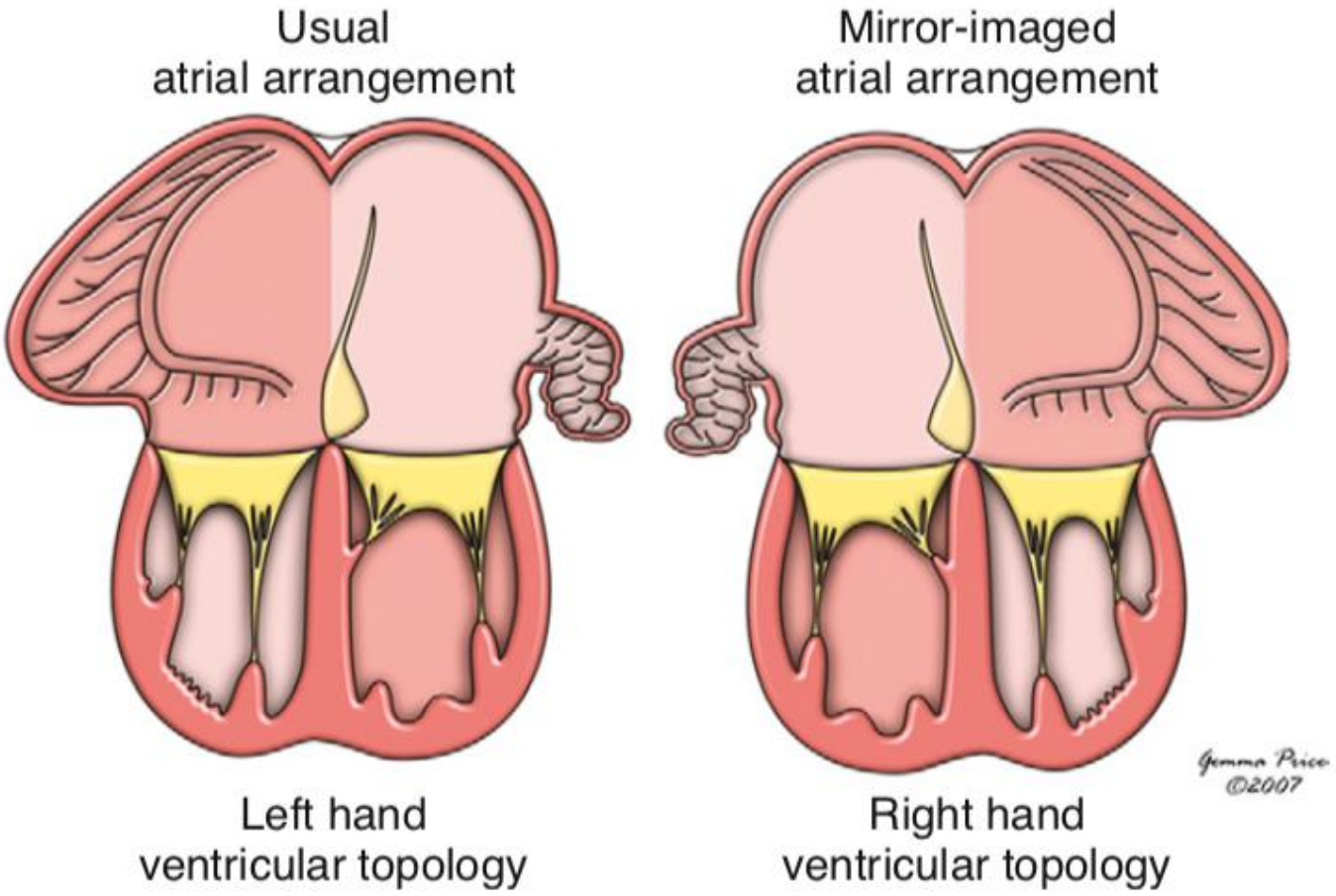
Discordant Atrioventricular Connections



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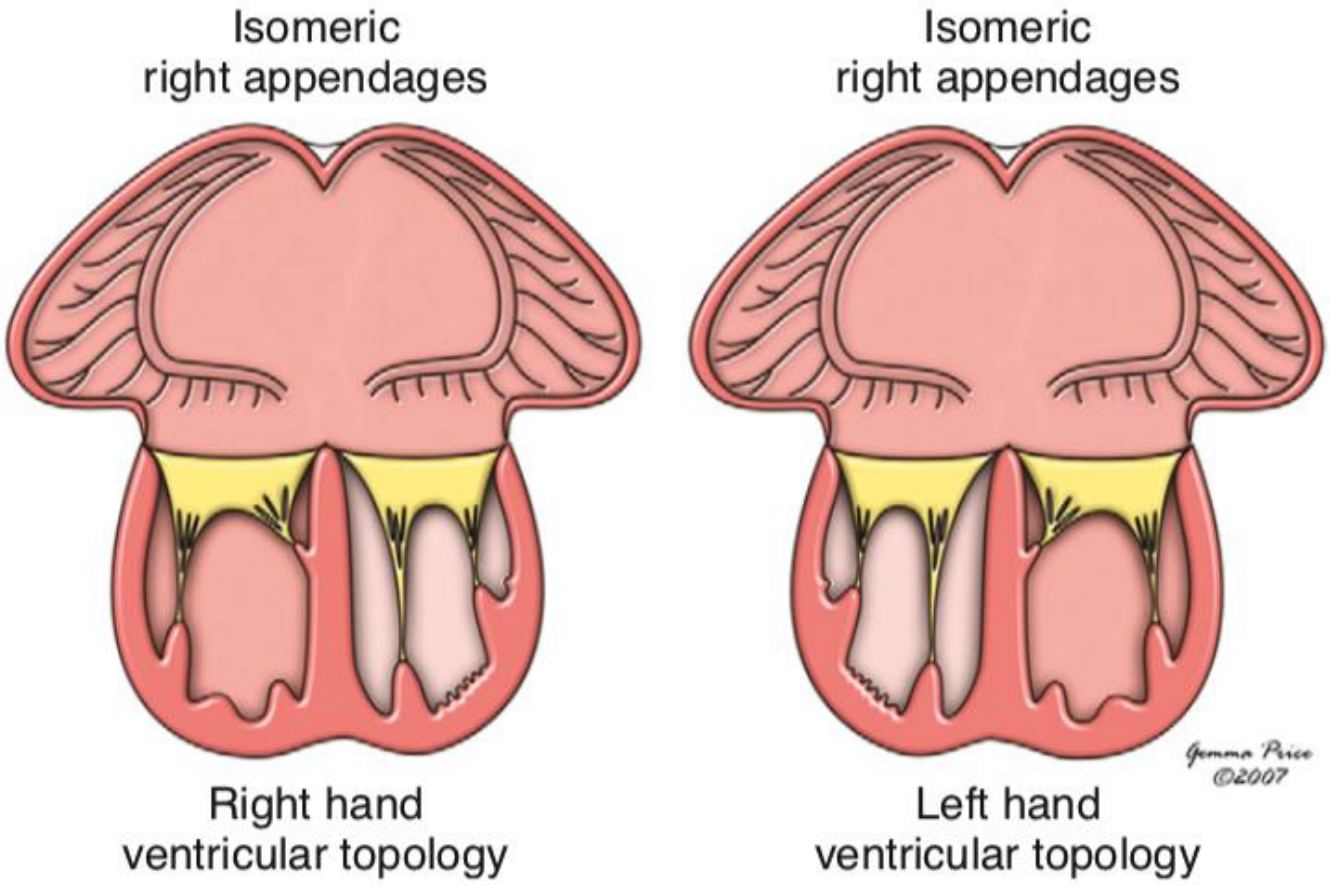
Biventricular AV Connections in Hearts With Isomerism of the Atrial Appendages



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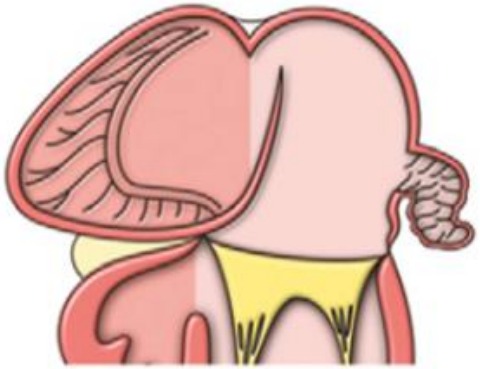
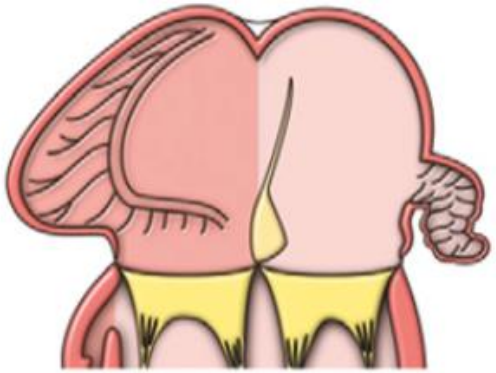
Univentricular Atrioventricular Connections

- Double inlet atrioventricular connections
- Absent right-sided atrioventricular connection
- Absent left-sided atrioventricular connection

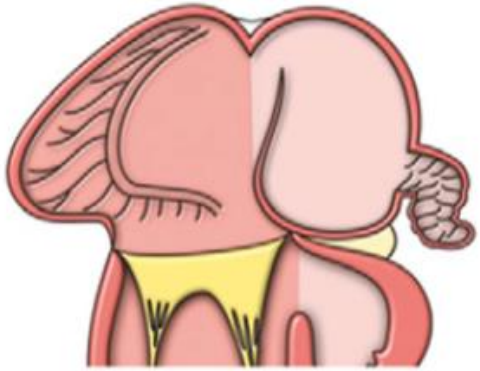
Univentricular Atrioventricular Connections



Absent right AV connection



Double inlet ventricle



Absent left AV connection

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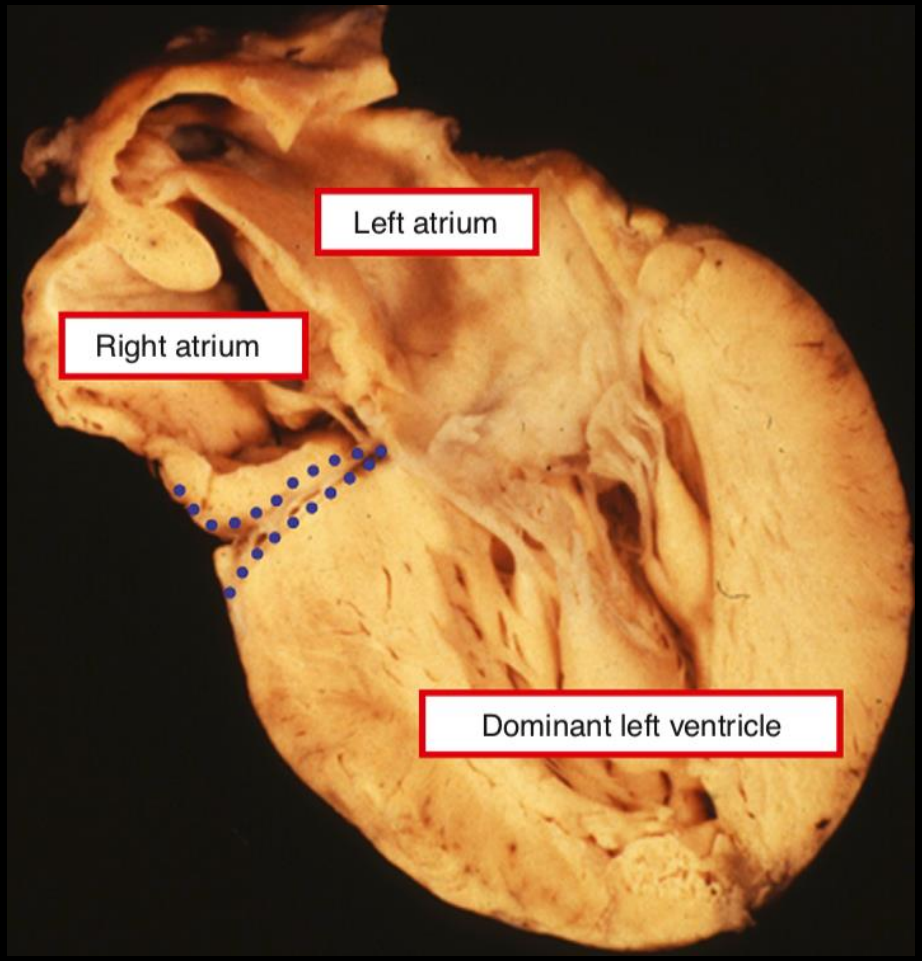
Absent Right Atrioventricular Connection (Tricuspid Atresia)



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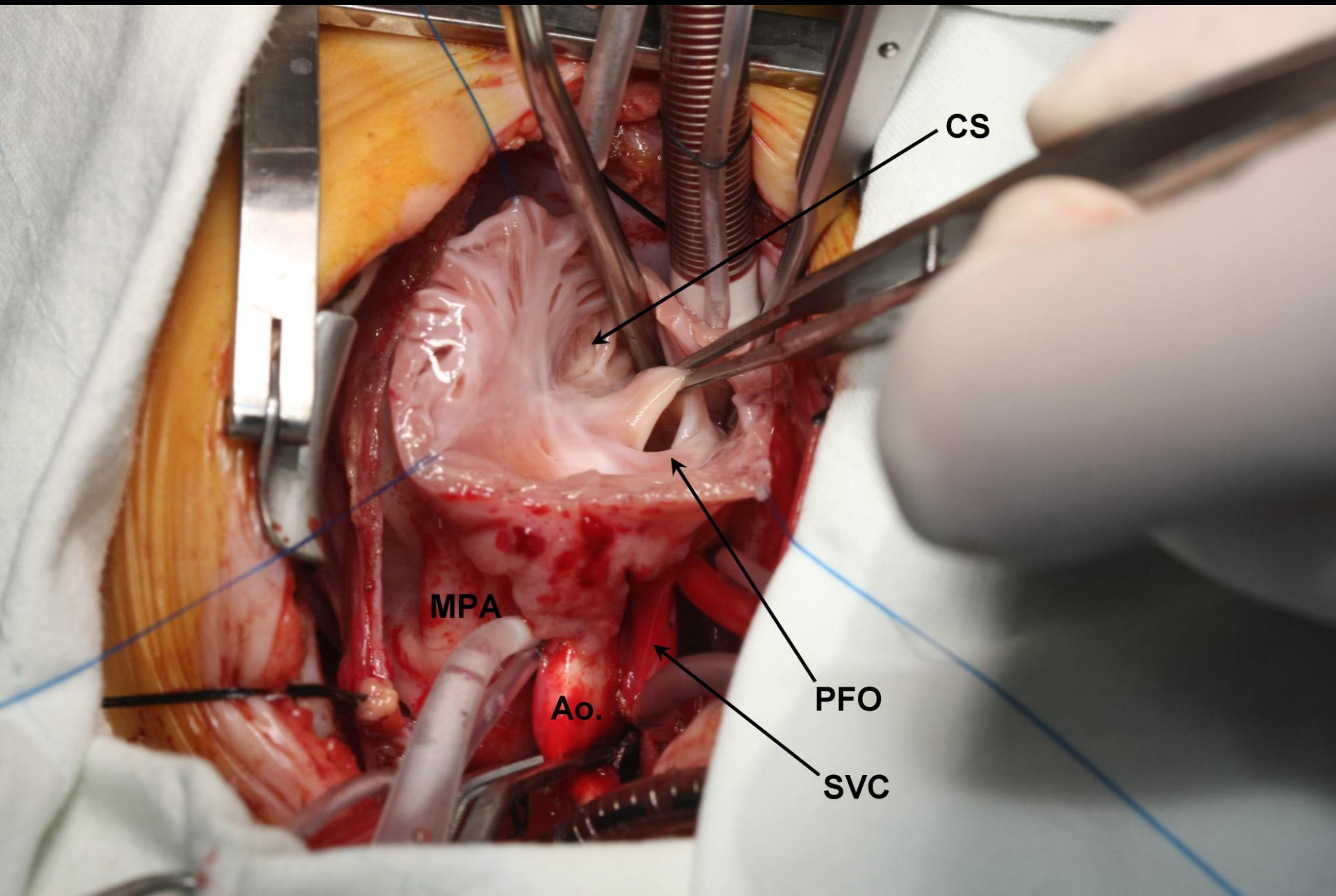
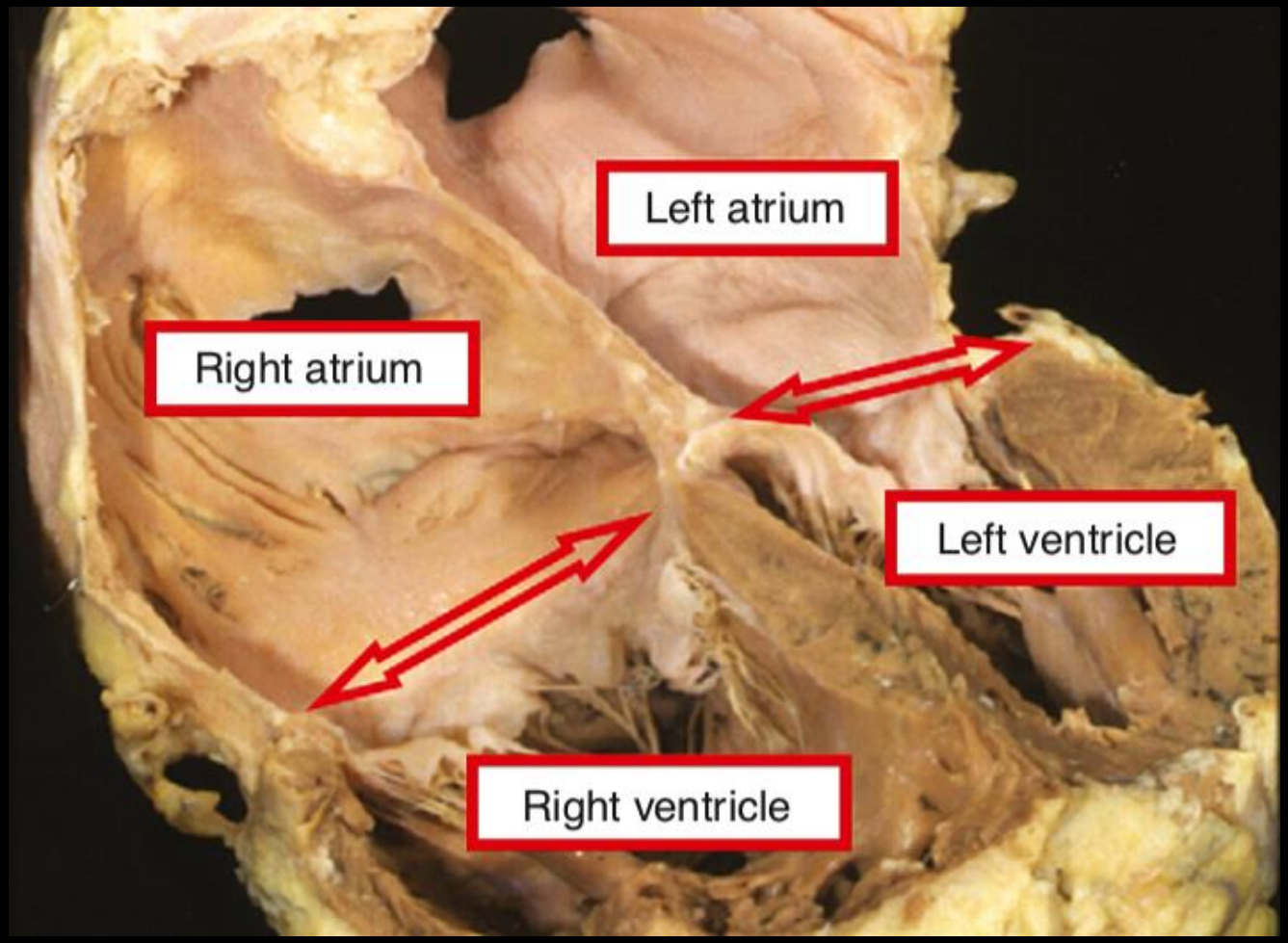
Absent Right Atrioventricular Connection (Tricuspid Atresia)



Arrangements of the Atrioventricular Valves

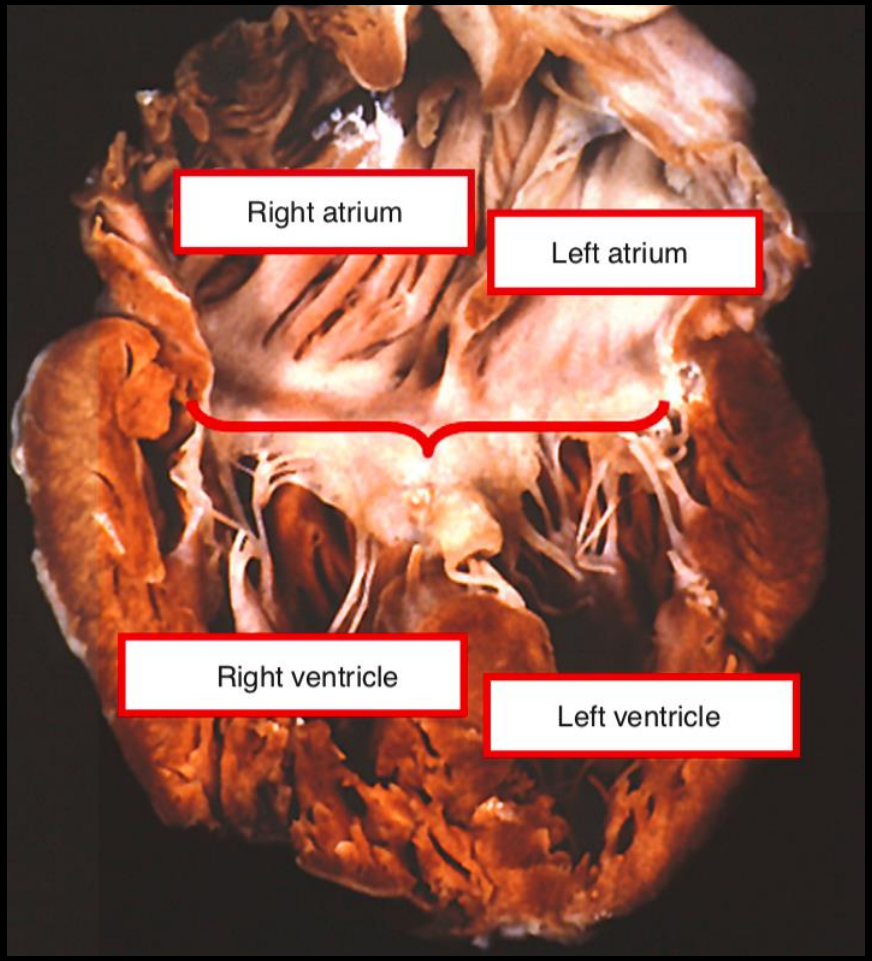
- Two patent valves
- A common valve
- One patent and one imperforate valve
- Straddling and overriding valves

Two Separate Atrioventricular Valves



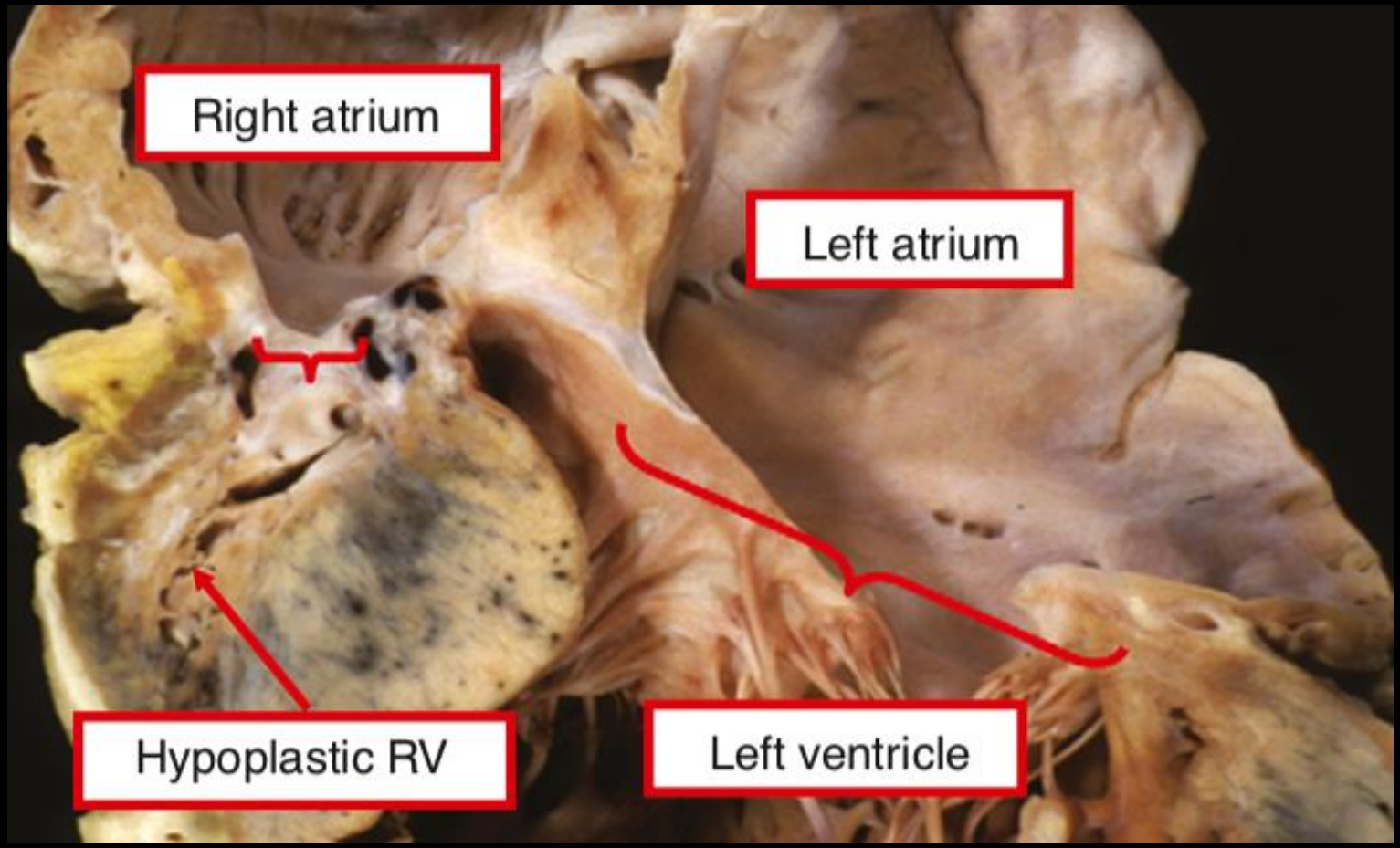
Anderson RH, et al. Paediatric Cardiology. 3rd ed.

A Common Atrioventricular Valve



Anderson RH, et al. Paediatric Cardiology. 3rd ed.

An Imperforate Right Atrioventricular Valve



Anderson RH, et al. Paediatric Cardiology. 3rd ed.

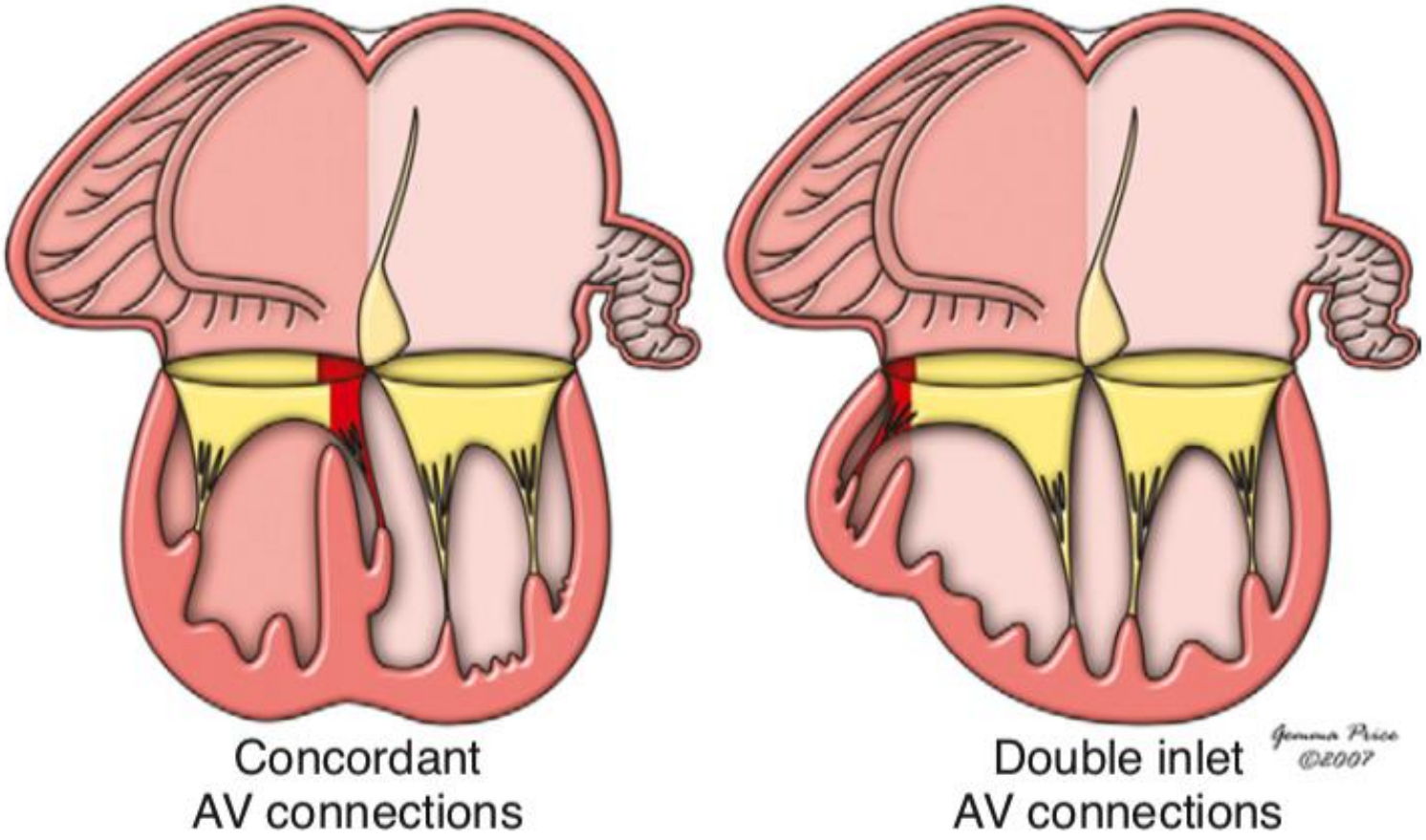
Straddling of a Atrioventricular Valve

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

Overriding of a Atriovantricular Valve

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

Straddling and Overriding Atrioventricular Valves



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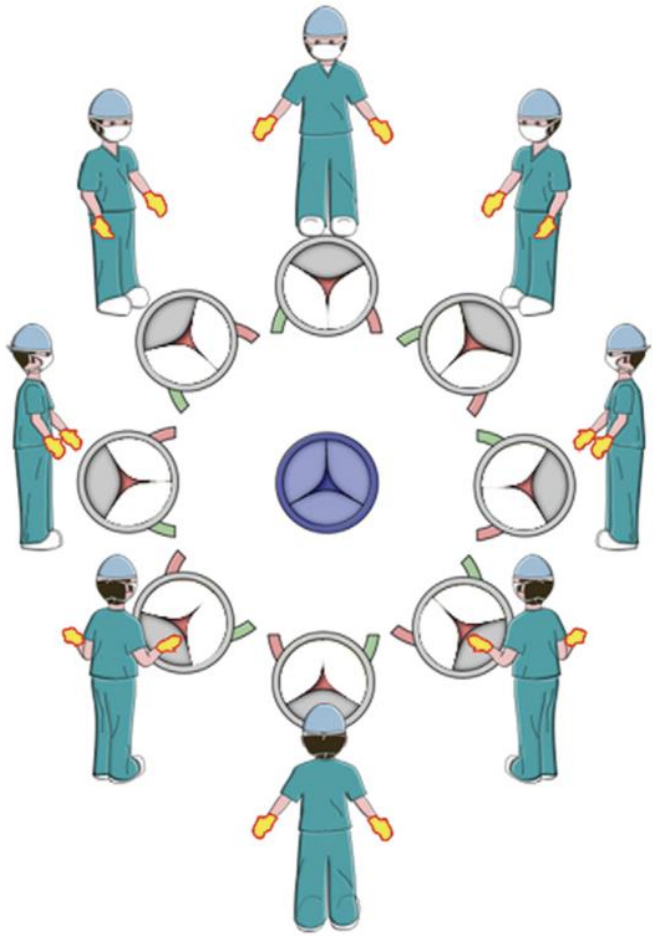
Ventriculo-Arterial Junctions

- Concordant ventriculo-arterial connection
- Discordant ventriculo-arterial connection
- Double outlet connection
- Single outlet connection
  - ✓ Common arterial trunk
  - ✓ Solitary arterial trunk
  - ✓ Single pulmonary trunk with aortic atresia
  - ✓ Single aortic trunk with pulmonary atreisa

Arterial Relationships

- Usually described at valvar level
- Description of aortic valvar position relative to the pulmonary valve

Arterial Relationships

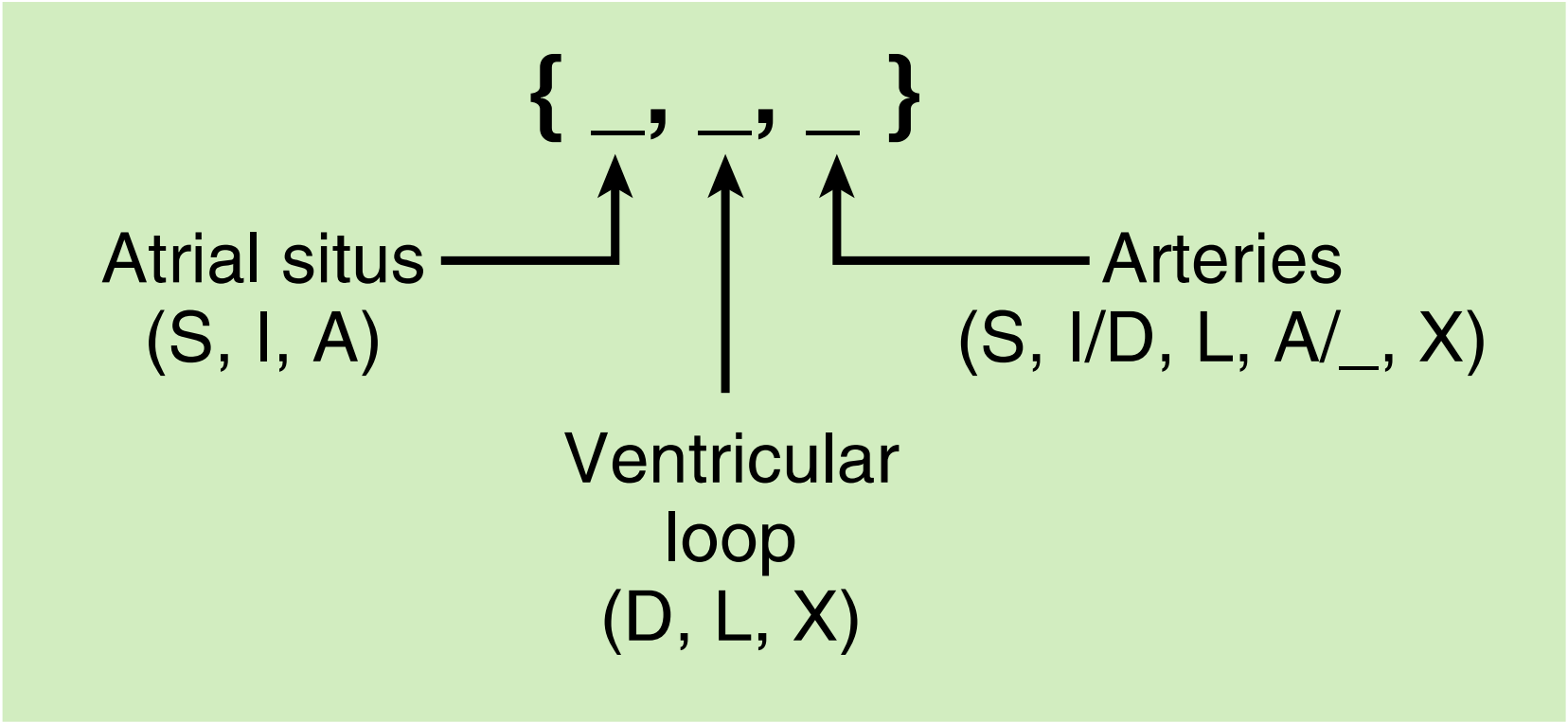


Anderson RH, et al. Paediatric Cardiology. 3rd ed.

Positions of Arterial Trunks

- Spiral fashion
- Parallel fashion

Segmental Set Notation



Selke FW, et al. Sabiston & Spencer Surgery of the Chest. 9th ed.

Examples of Segmental Set Notation

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

References

1. Chapter 1. Terminology. In: Anderson RH, et al. Paediatric Cardiology. 3rd ed.

2. Chapter 2. Anatomy. In: Anderson RH, et al. Paediatric Cardiology. 3rd ed.

3. Chapter 105. Segmental Anatomy. In: Selke FW, et al. Sabiston & Spencer Surgery of the Chest. 9th ed.

Atlas of Congenital Heart Disease Nomenclature

An Illustrated Guide to the Van Praagh and Anderson Approaches to Describing Congenital Cardiac Pathology

David S. Ezon, MD
Jason F. Goldberg, MD
William B. Kyle, MD

edited by
Robert H. Anderson, MD and Richard Van Praagh, MD

with contributions by
Wyman W. Lai, MD and Daniel J. Penny, MD

illustrated by
Gemma Price-Morgan

Baylor College of Medicine
Texas Children's Hospital