

Clinical Anatomy of the Aorta

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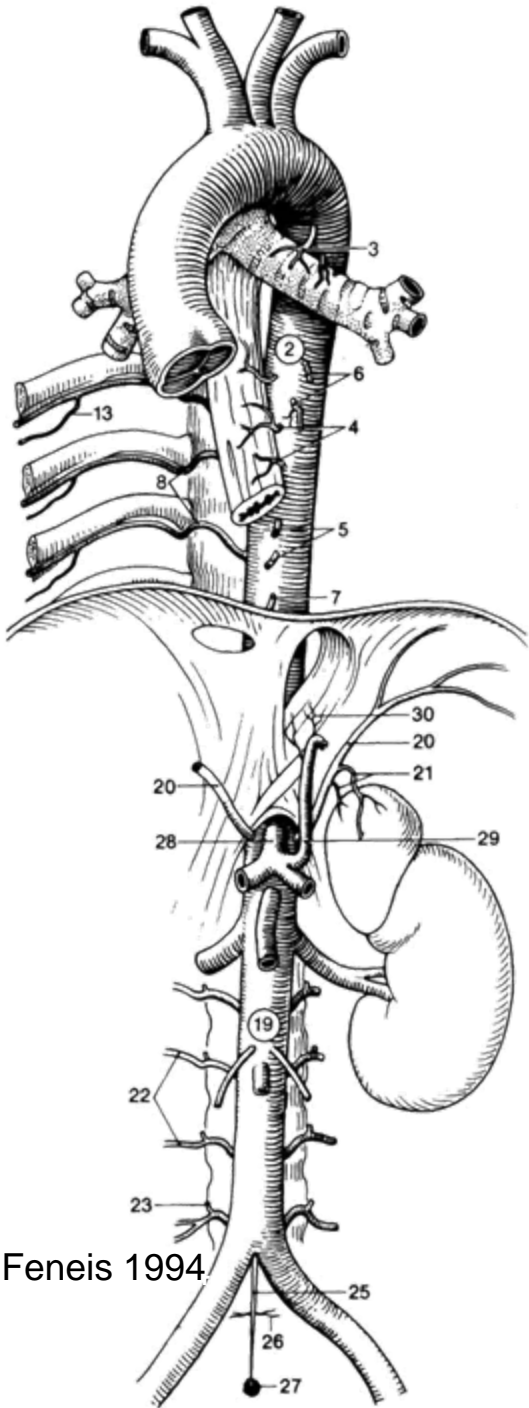
25 March 2008

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General Anatomy of the Aorta

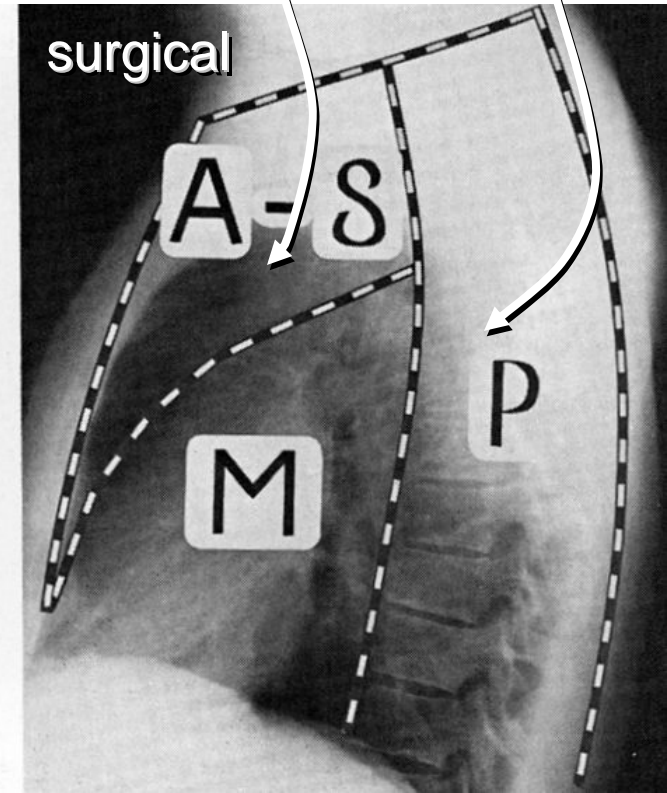
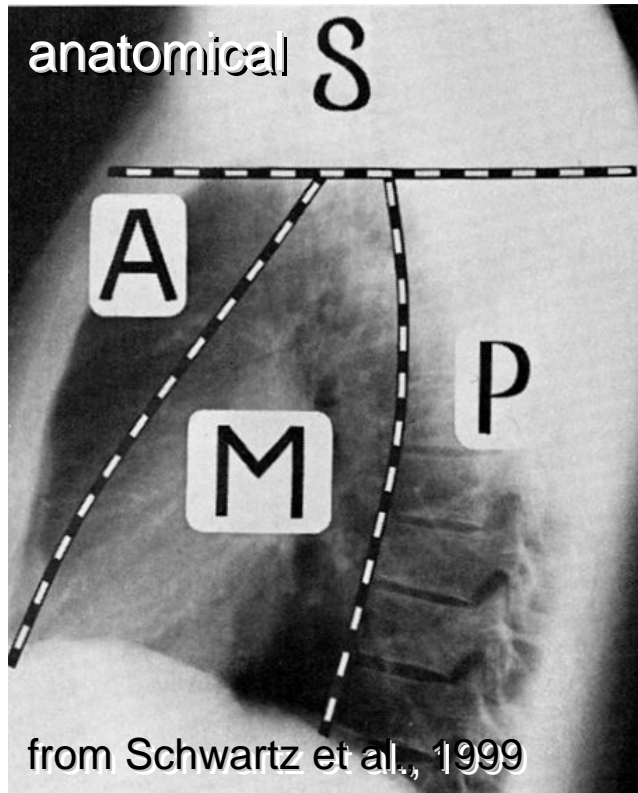
- Ascending aorta
- Aortic Arch
- Thoracic (descending) aorta
- Abdominal aorta



Divisions of the Mediastinum

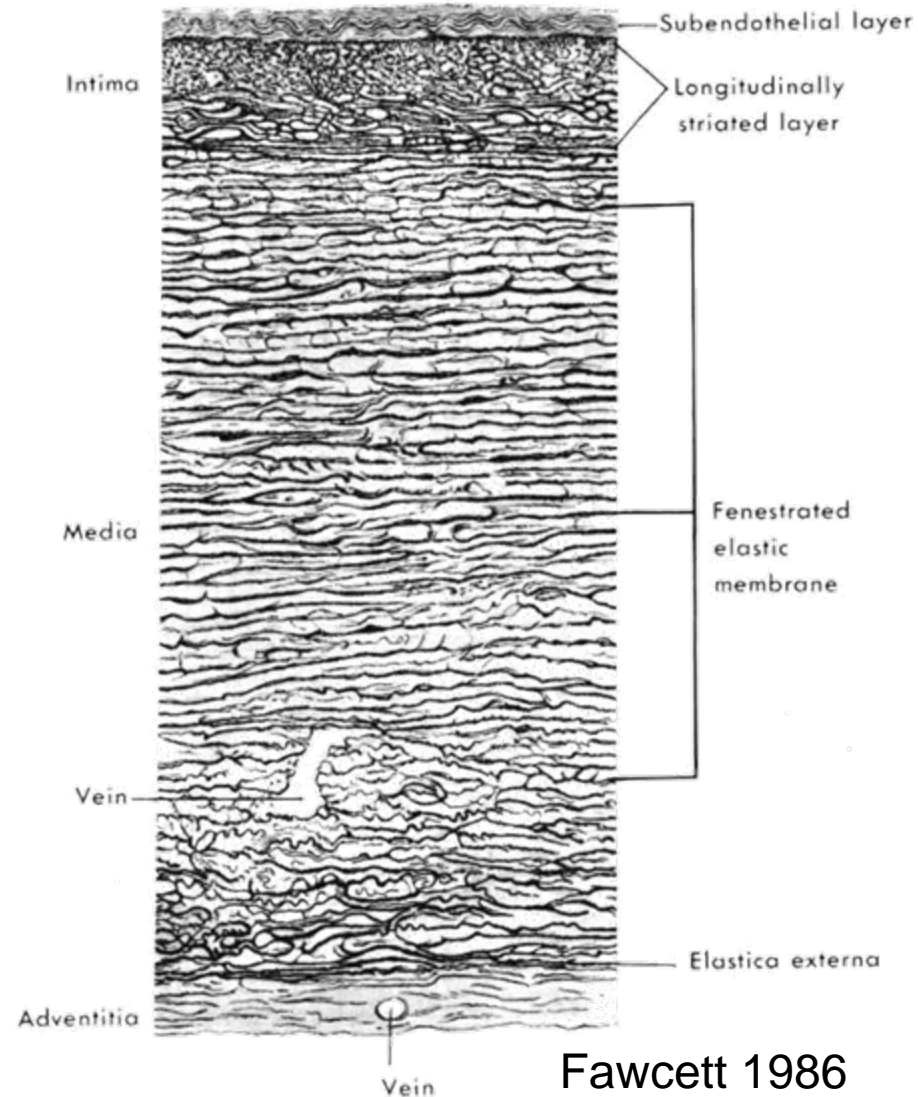
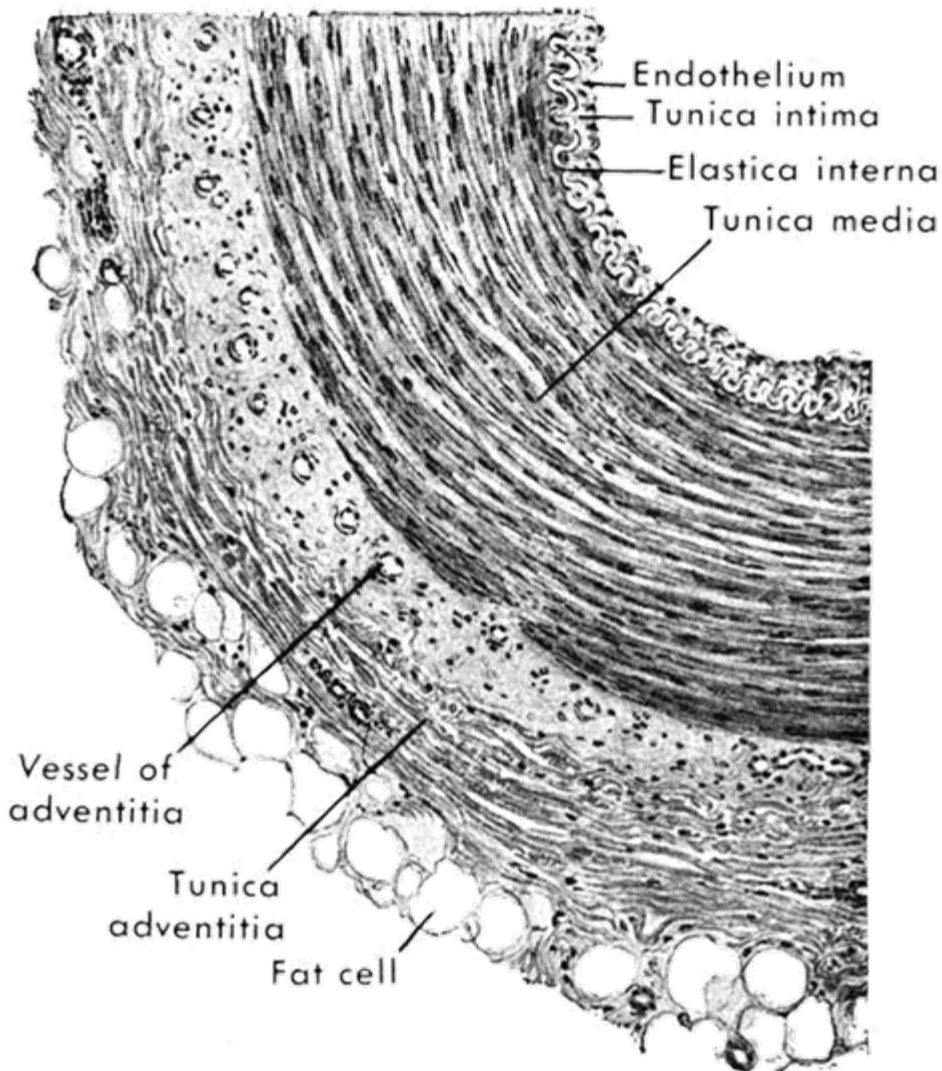
ascending aorta,
arch of aorta

thoracic
aorta

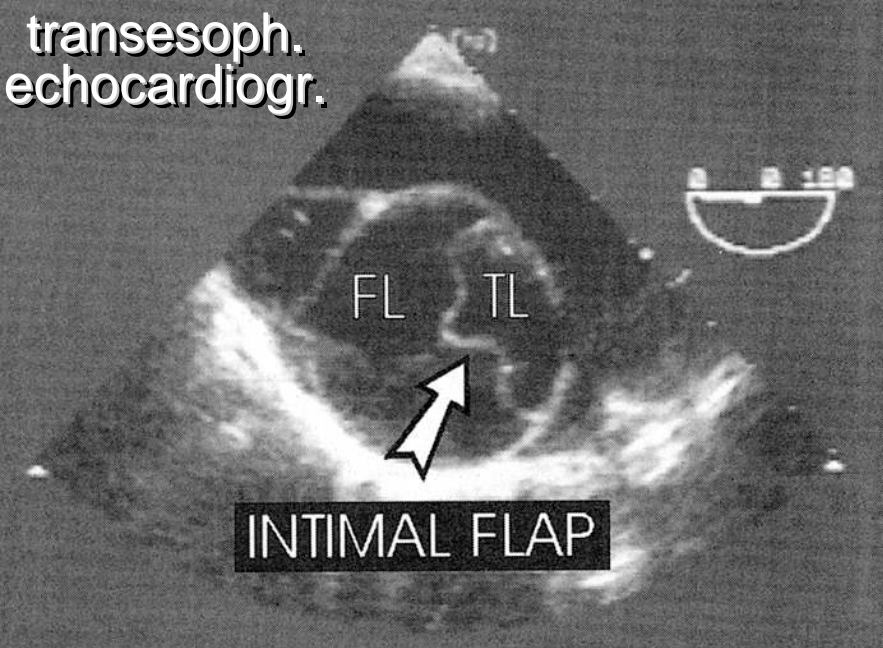


Histology of Arteries and of the Aorta

- Layers of CVS: tunica intima, tunica media, tunica adventitia
- Aorta is an elastic artery with an expanded, elastic media

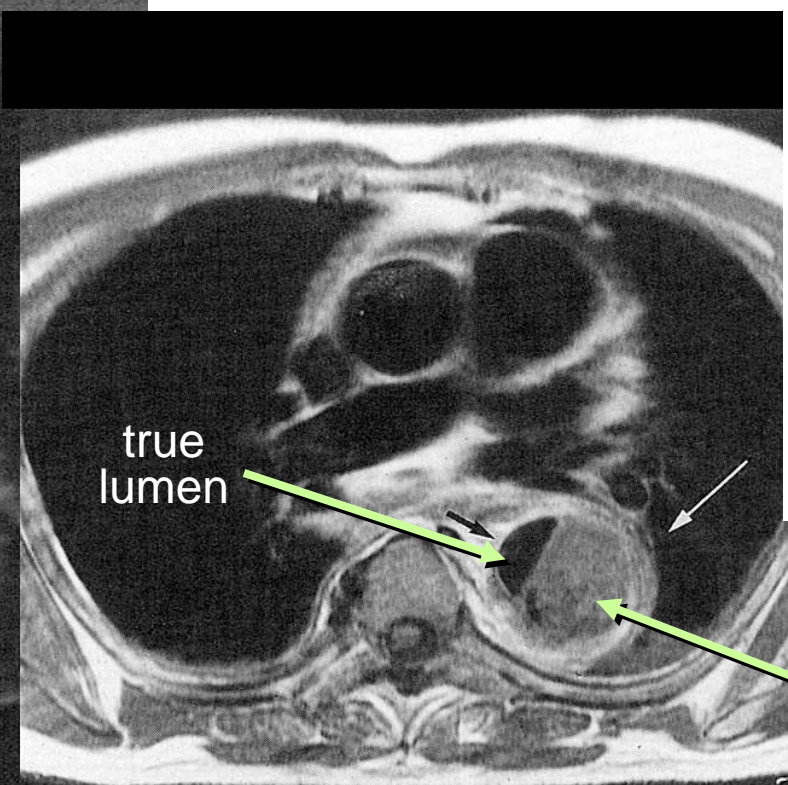
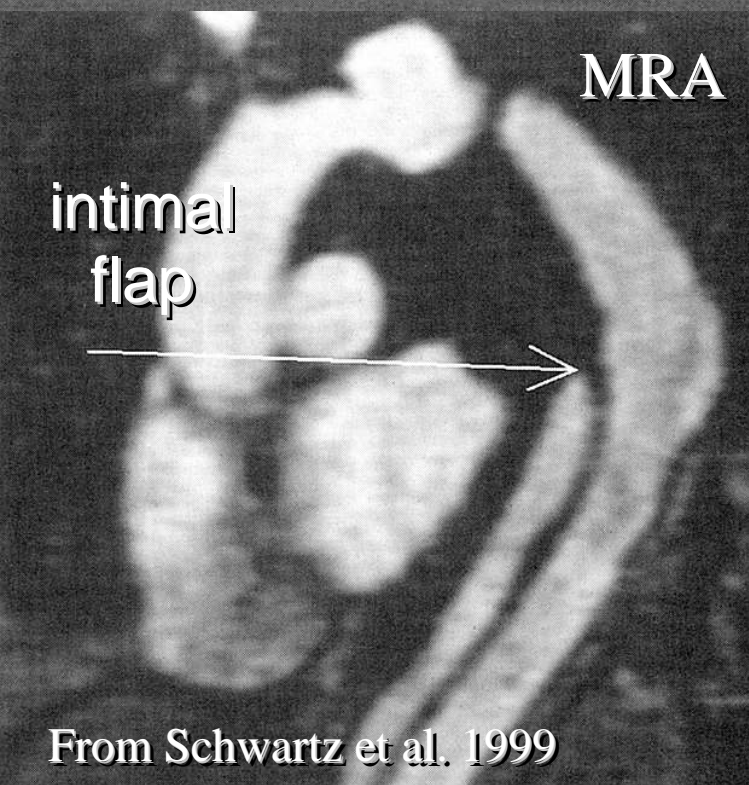


transesoph.
echocardiogr.

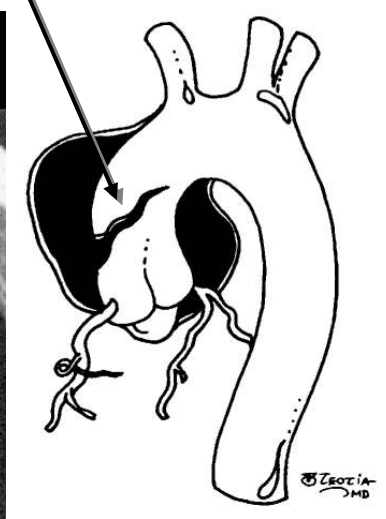


Aortic Dissection

- tear in intima leading to separation of the tunica media & formation of a “false lumen”
- Re-entry tear leading to a “double-barreled aorta”



intimal tear



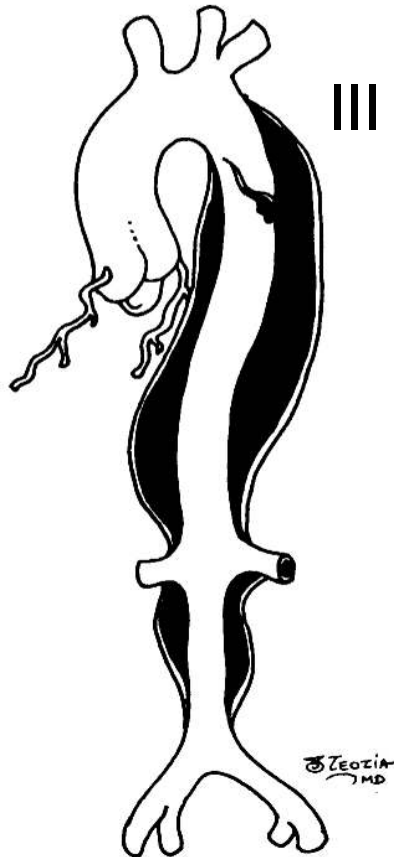
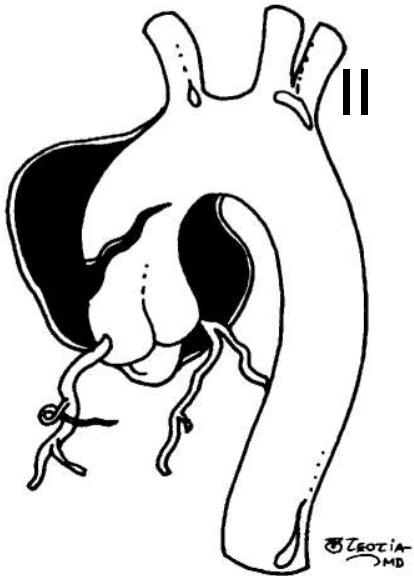
From Blackburne 1998

false lumen

Classification of Aortic Dissection

DeBakey

- Types I & II: tear in asc. aorta
- Type III: tear in thor. aorta
- Type I: asc. & desc. Aorta
- Type II: only asc. Aorta
- Type III: only desc. aorta



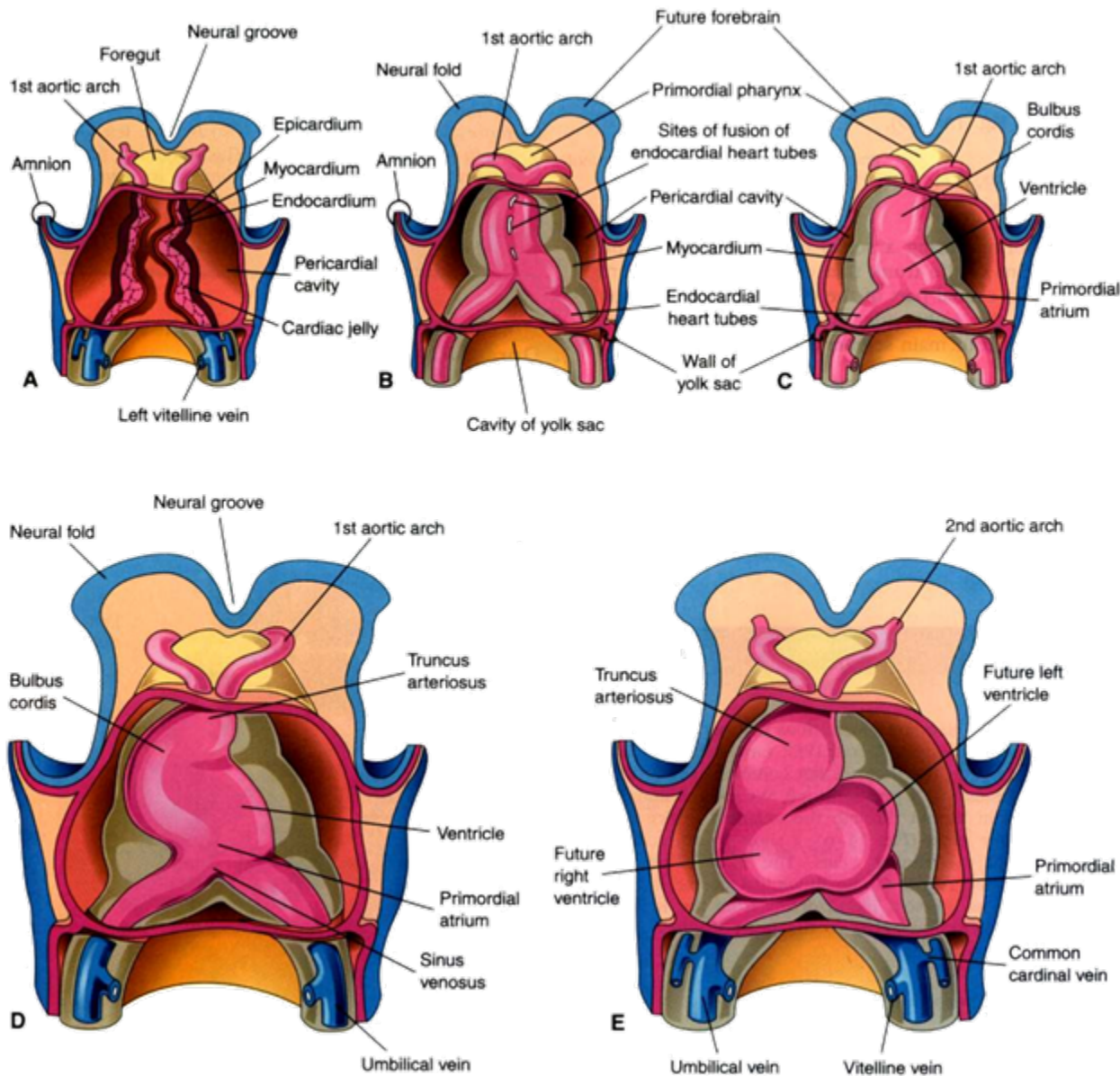
Stanford

- Type A: asc. aorta ± desc. aorta
- Stanford Type A includes DeBakey Types I & II
- Type B: desc. aorta



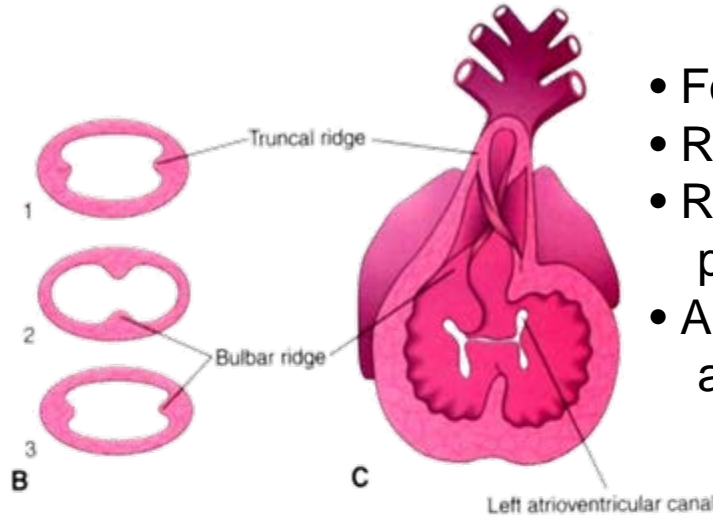
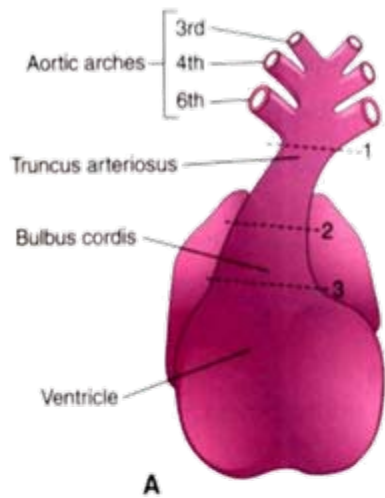
From Blackbourne 1998

Development of the Aorta

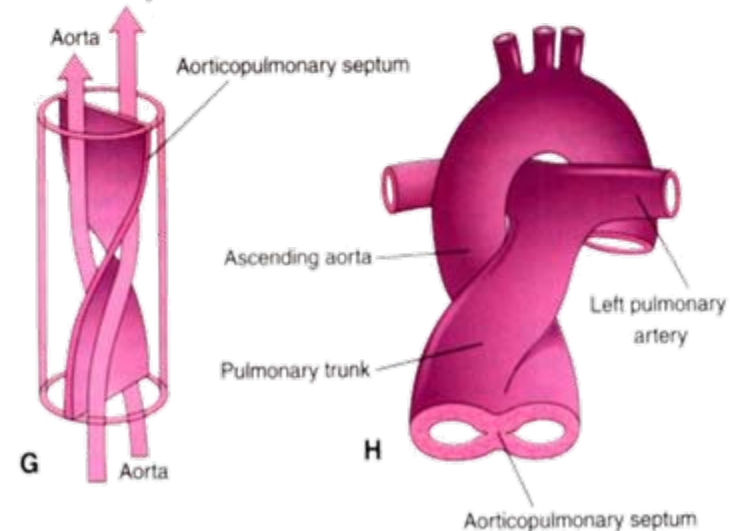
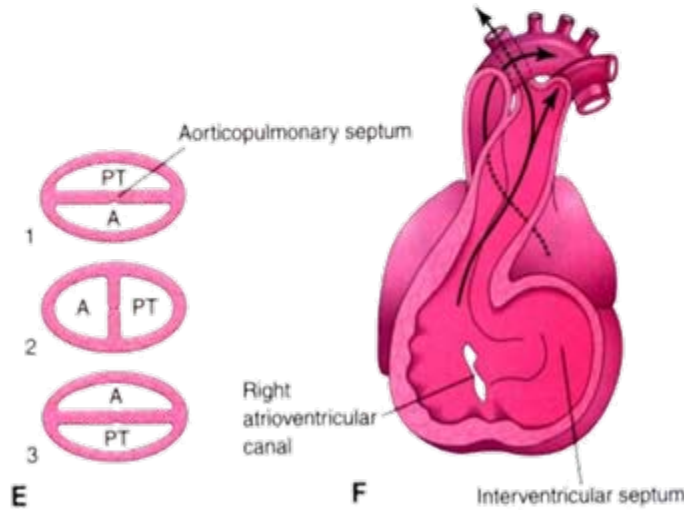
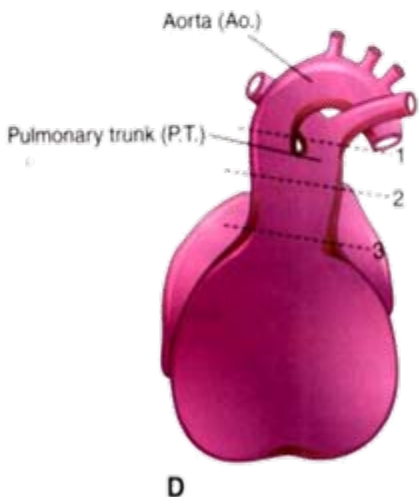


- Paired endocardial tubes fuse into a single tube
- Endocardial tube elongates & constricts
- Subdivisions
 - Sinus venosus
 - Atrium
 - Ventricle
 - Bulbus cordis
 - Truncus arteriosus
- Truncus arteriosus is partitioned into the aorta and pulmonary trunk

Partitioning of the Truncus Arteriosus



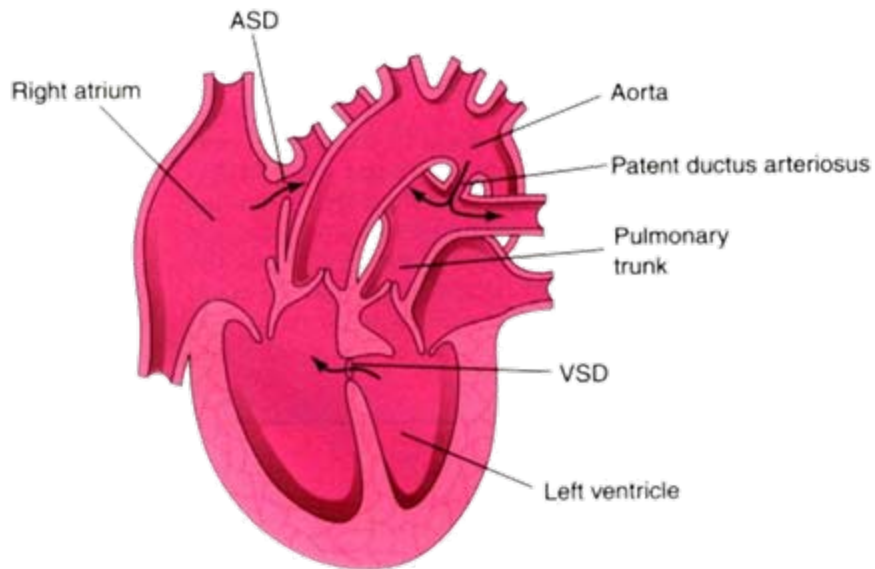
- Formation of bulbar & truncal ridges
- Ridges spiral 180° as they grow
- Ridges fuse to form aortico-pulmonary septum
- Aortico-pulmonary septum divides aorta and pulmonary trunk



Defects in Partitioning of the Truncus Arteriosus

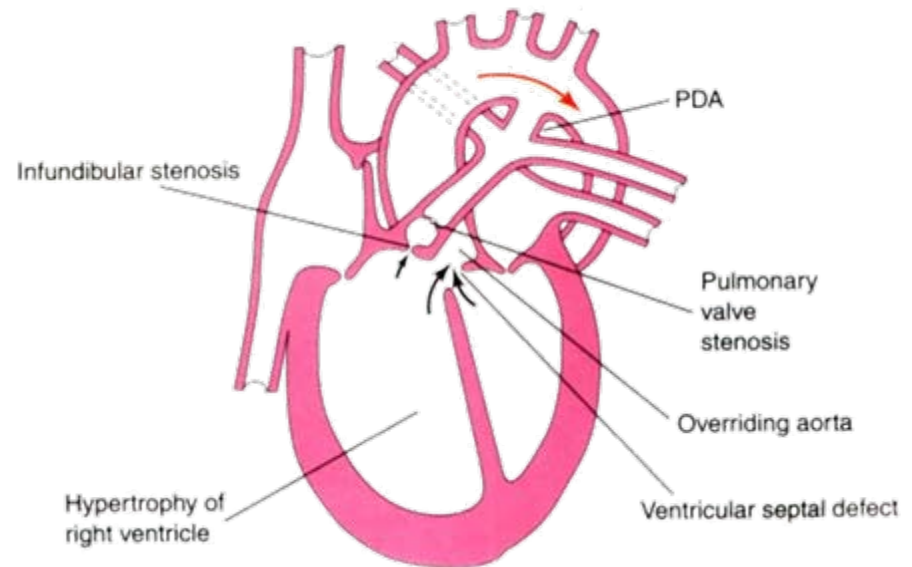
Transposition of the Great Arteries (TGA)

- Most common cyanotic neonatal heart defect
- Failure of aorticopulmonary septum to take a spiraling course
- Fatal without PDA, ASD, & VSD



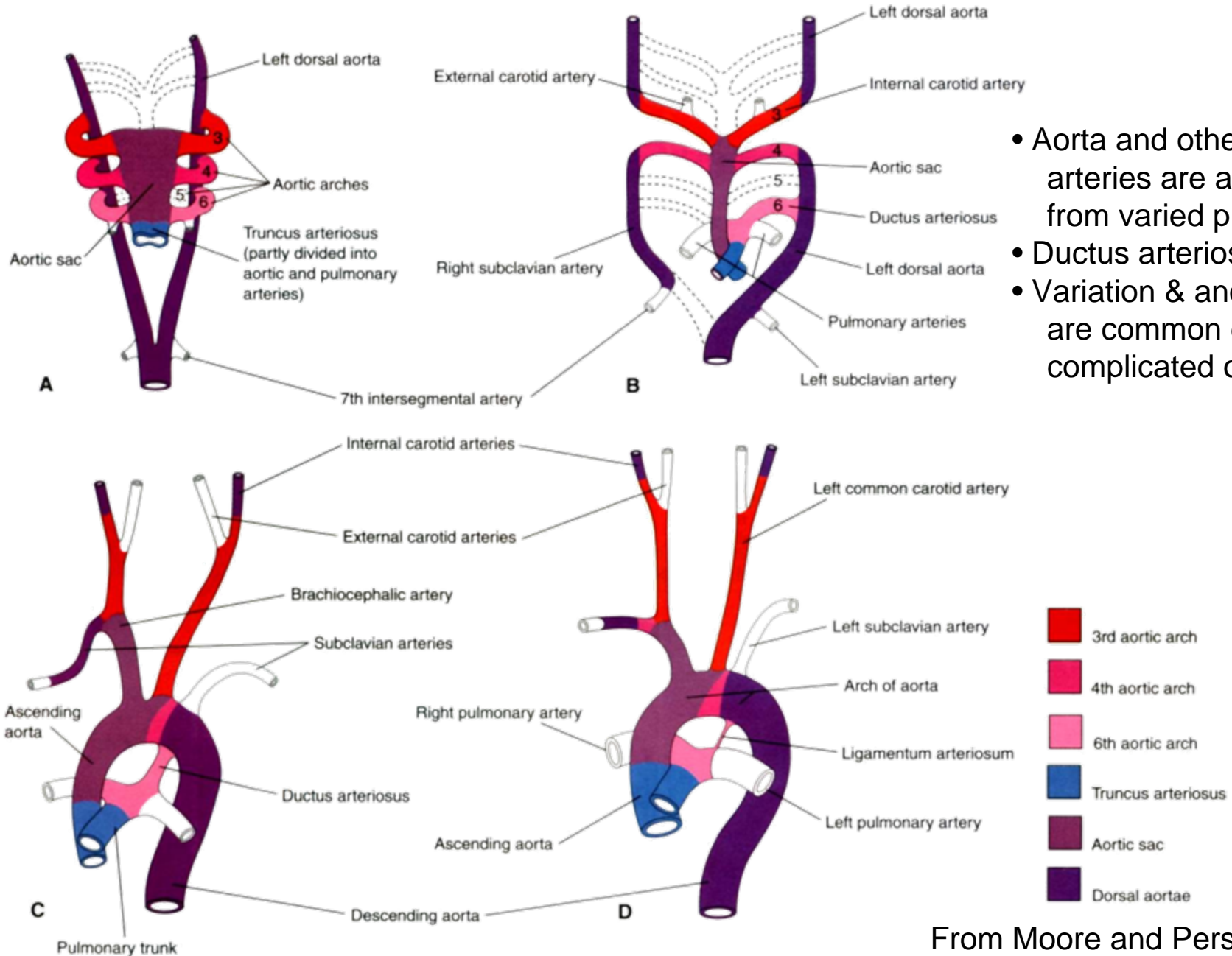
Tetralogy of Fallot

- Four co-occurring heart defects
 - Pulmonary stenosis
 - Ventricular septal defect
 - Overriding aorta (dextroposition)
 - Right ventricular hypertrophy
- Asymmetrical fusion of bulbar & truncal ridges



From Moore and Persaud, 1998

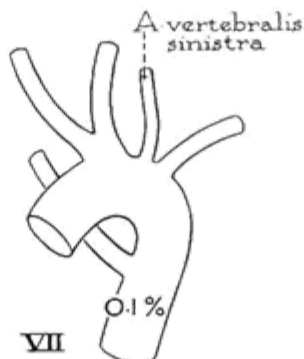
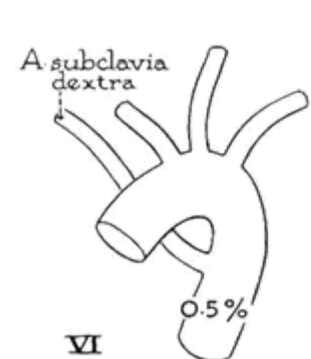
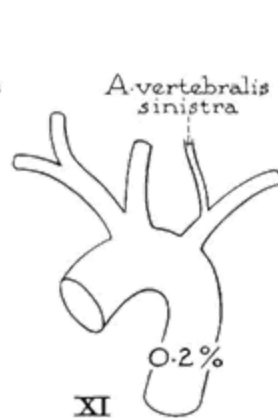
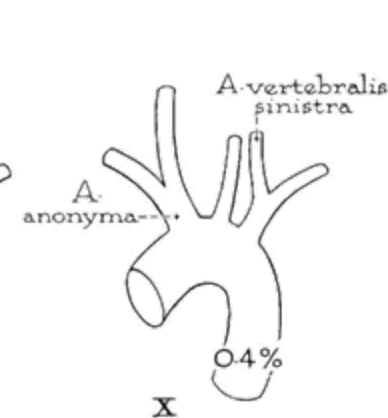
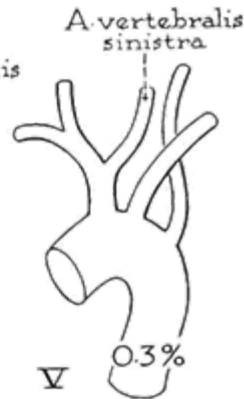
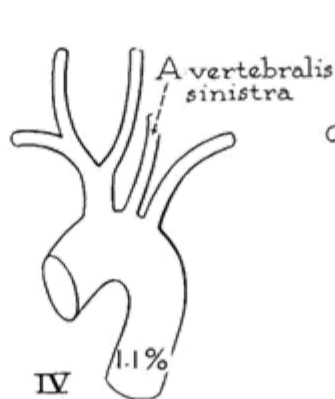
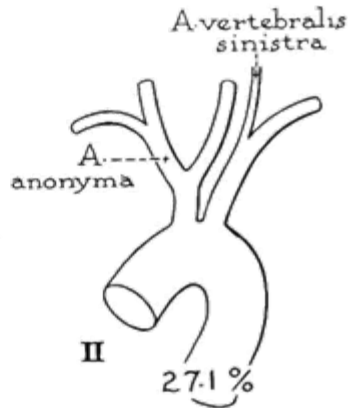
“Cobbling Together” the Aorta



- Aorta and other major arteries are assembled from varied precursors
- Ductus arteriosus
- Variation & anomalies are common due to this complicated ontogeny

Variation in Branching of the Aortic Arch

- Based on a study of 1000 cadavers by Liechty et al. 1957
- “Textbook” example (variant I) occurs less than two-thirds of the time
- Most are only problematic insofar as they may be initially confusing during surgery



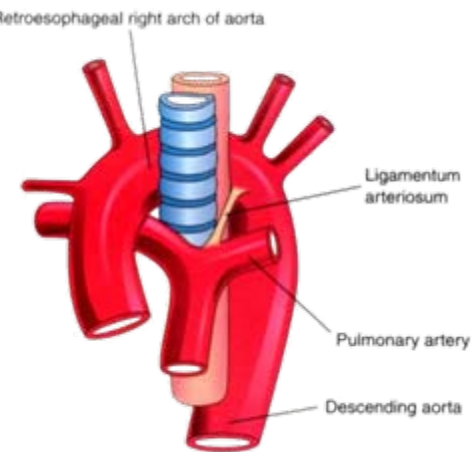
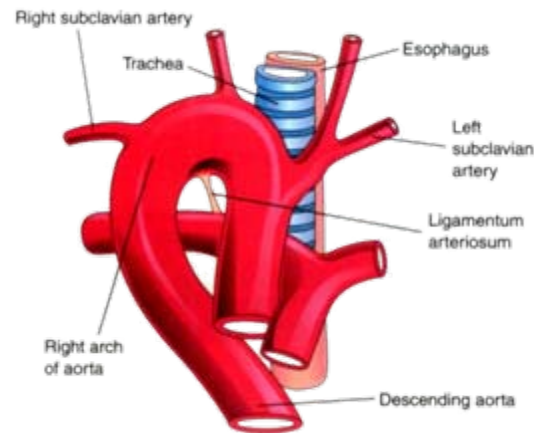
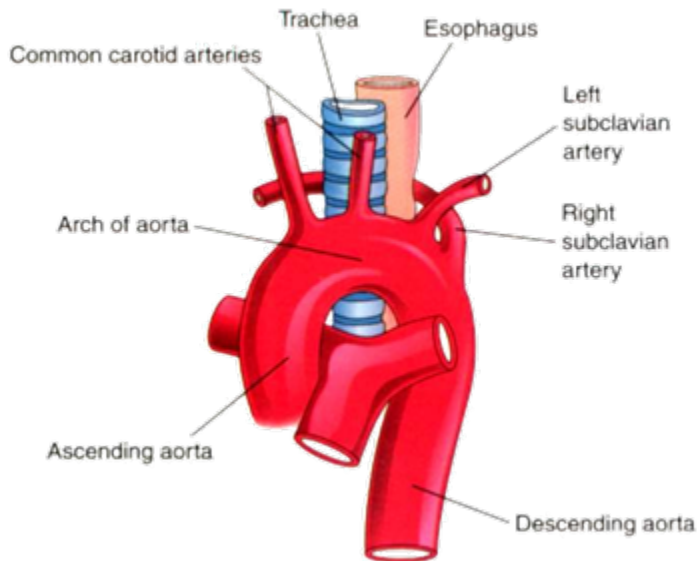
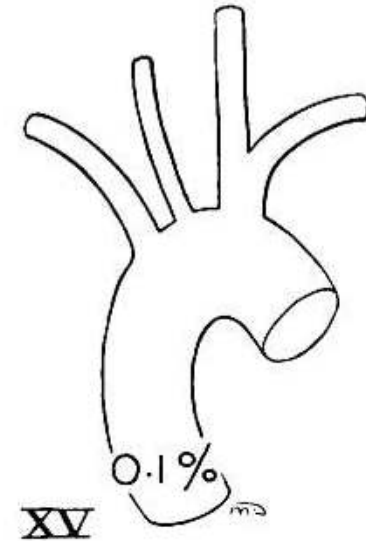
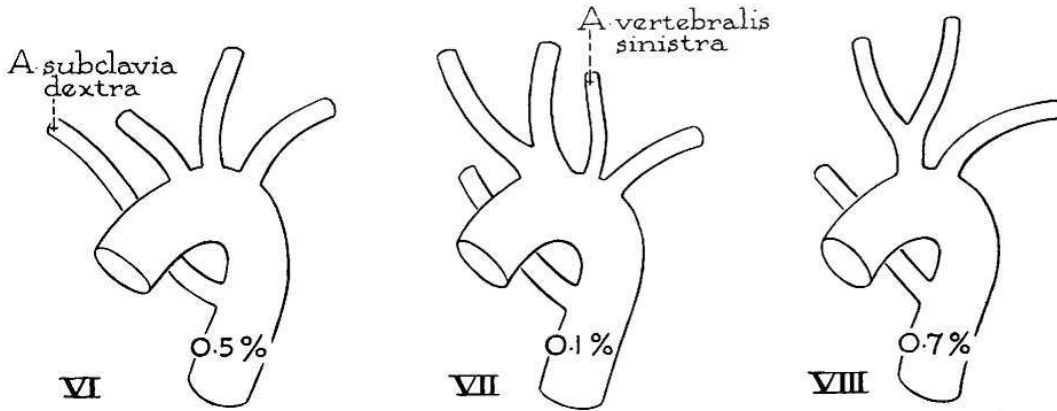
Vascular Rings

Anomalous Right Subclavian Artery

Right aortic arch

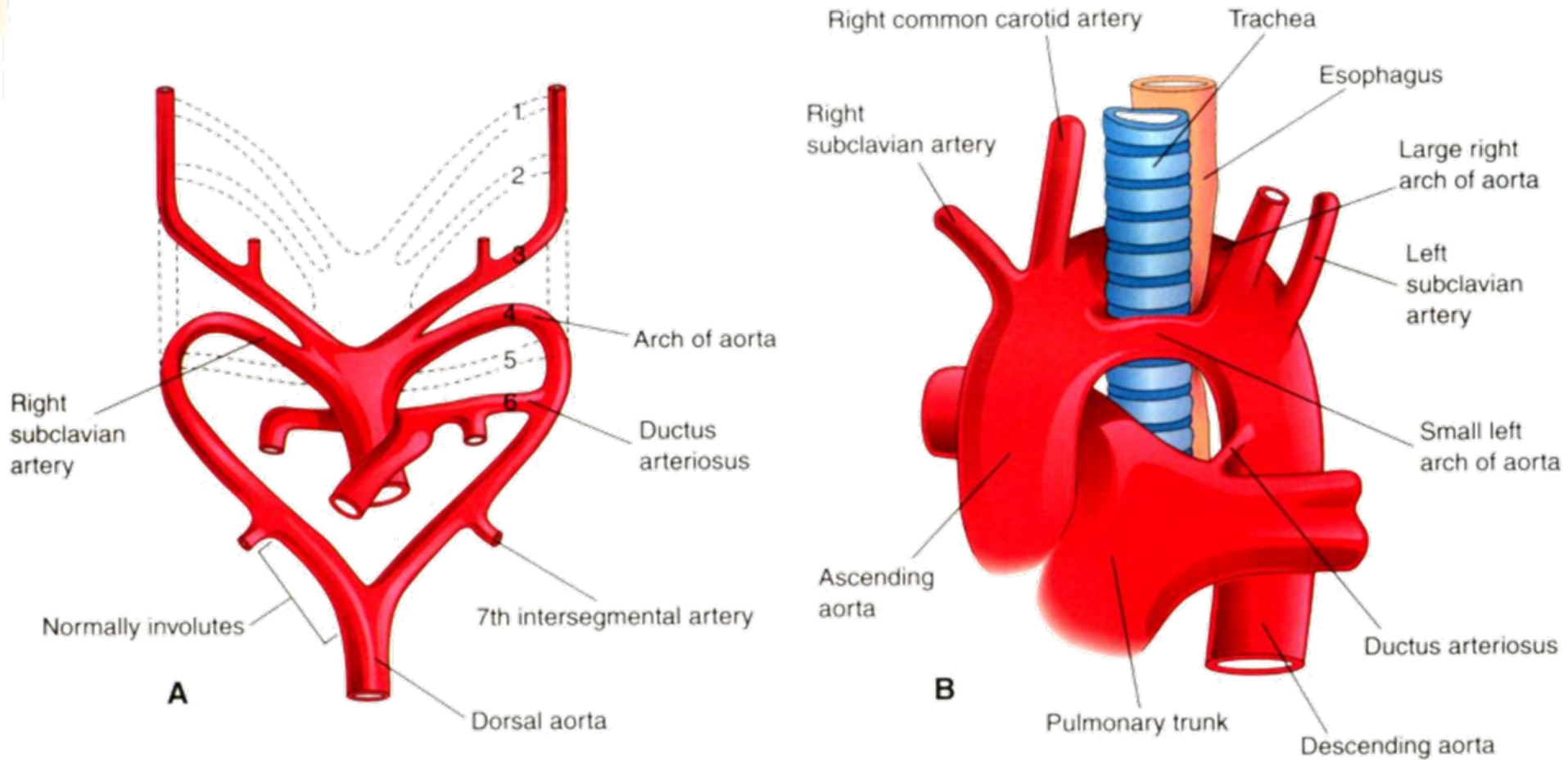
Retroesophageal course compresses trachea & esophagus

Can take a retroesophageal course



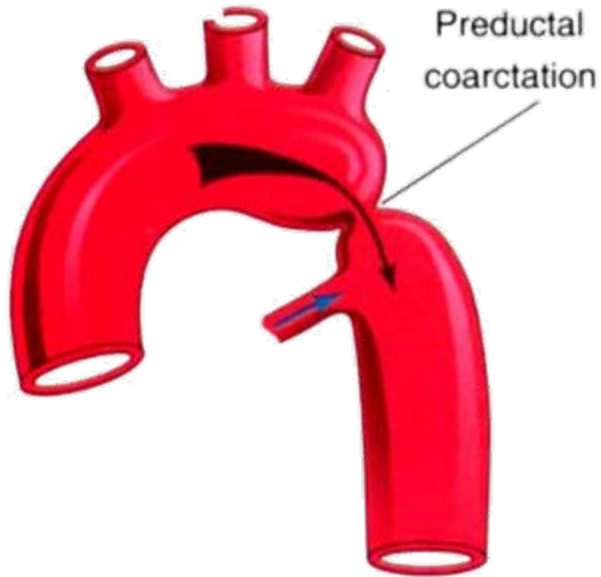
Vascular Rings

Double Aortic Arch

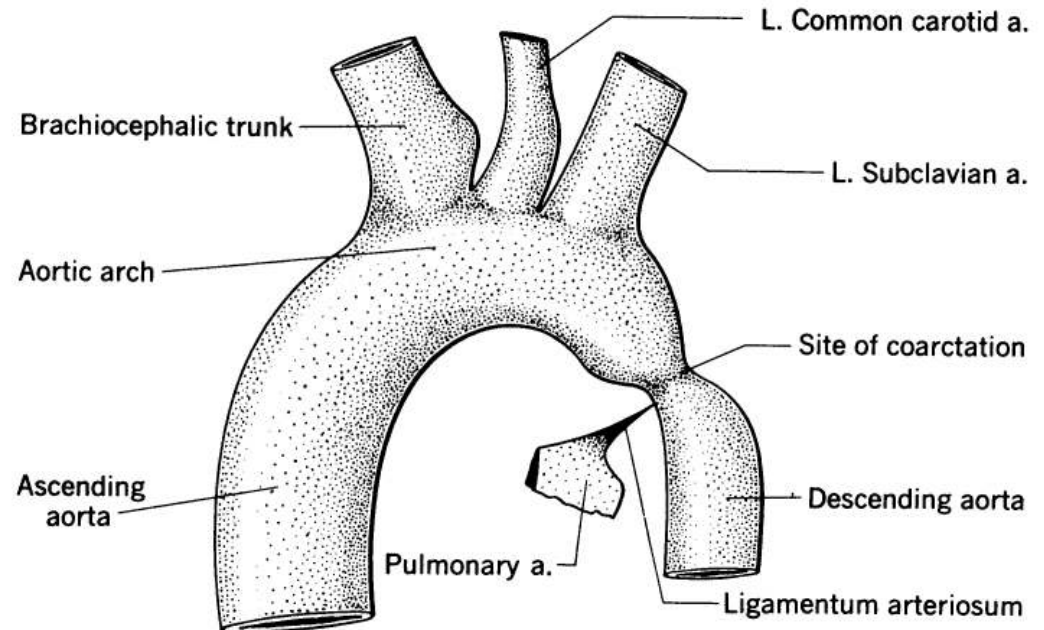
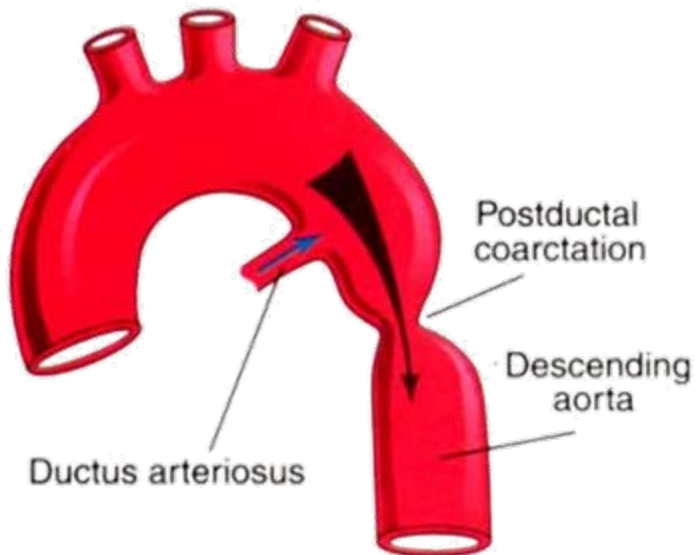


From Moore and Persaud, 1998

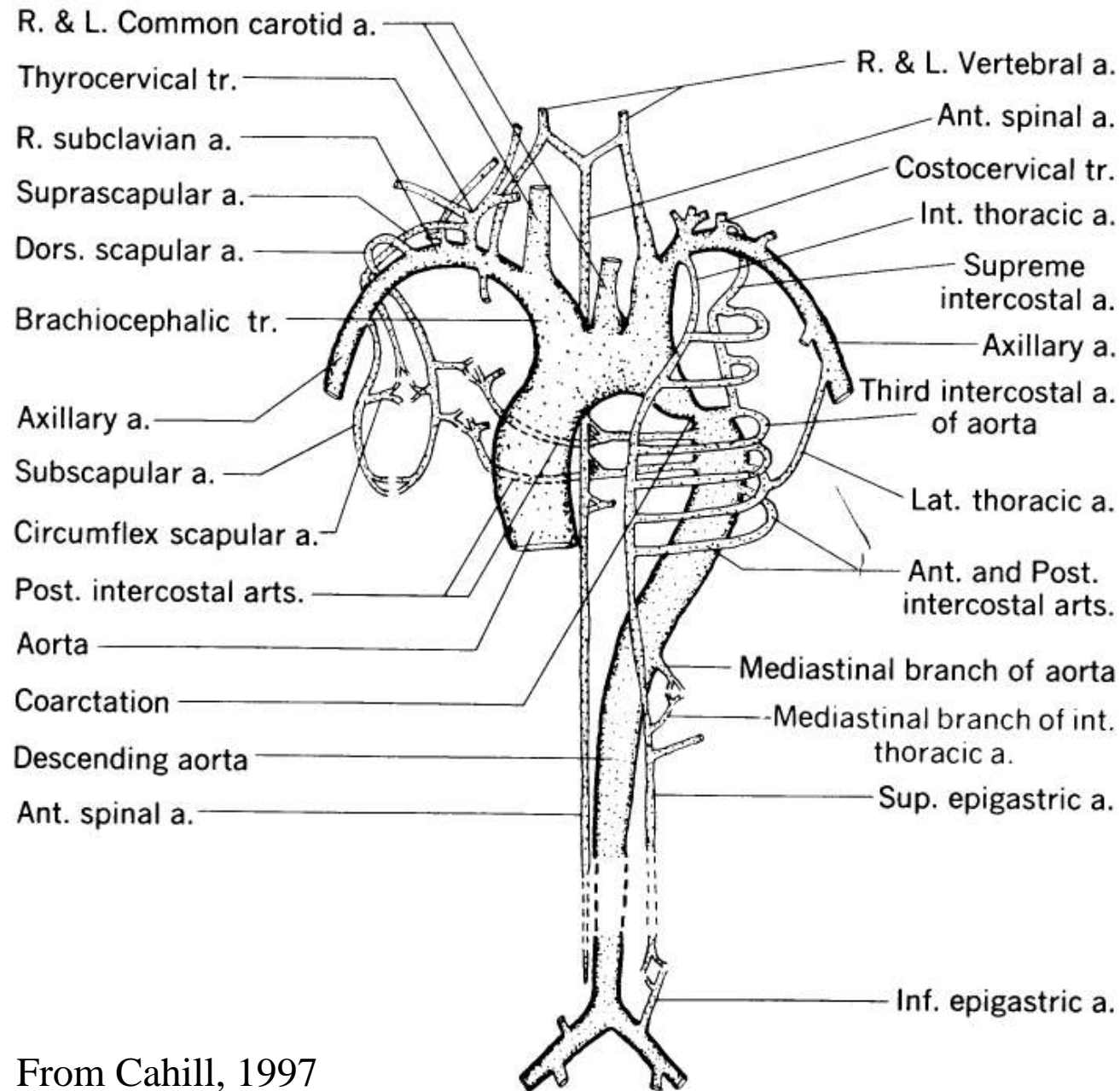
Coarctation of the Aorta



- Constriction of the aorta distal to the left subclavian artery
- Typically near ductus arteriosus (lig. arteriosum)
 - Preductal (= infantile)
 - Postductal (= “adult”)
 - Juxtaductal



Coarctation of the Aorta



Collateral Circulation

- Subclavian → IMA → intercostals → aorta
- Subclavian → IMA → sup. epigastr. → inf. epigastr. → iliac → aorta
- Subclavian → cervical & scap. branches → intercostals → aorta
- Subclavian → vertebral → ant. spinal → intercostals & lumbar → aorta

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