The Aortic Arches
and
The Foetal Circulation

Alfred Cuschieri
Department of Anatomy
University of Malta
The Aortic Arches

- Connect the outflow tract of the heart to paired dorsal aortae.

- Lie in the branchial arches and supply them.

- Develop in cranio-caudal sequence.

- They are labelled 1 to 6 but the fifth branchial arch fails to develop.
Changes in Aortic Arches

4th week:
1st arch → Maxillary artery
2nd arch → Stapedial artery

5th week

6th week

3rd arch → Subclavian artery
loses connection with aortae

4th arch

6th arch → Asymmetric development
4th and 6th Aortic Arches Develop Asymmetrically

Right 4th arch
Atrophies

Right subclavian artery
-2ndry outgrowth

Right 6th arch
atrophies

Right pulmonary artery
-2ndry outgrowth

Left 4th arch
Aorta

Left subclavian artery
-2ndry outgrowth

Left 6th arch
Ductus arteriosus

Left pulmonary artery
-2ndry outgrowth
1. Oxygenated blood in umbilical vein is under increased pressure due to uterine contractions on placenta …

2. ….it is shunted via the ductus venosus into the inferior vena cava

3. In the right atrium, blood from IVC is directed mainly to foramen ovale, and from the SVC to the AV opening

4. The ductus arteriosus shunts most of the blood from pulmonary trunk to the aorta

5. The lungs are collapsed shutting off most of the pulmonary circulation

6. The left ventricle pumps all the blood into the aorta, to supply the body and placenta.
The foetal circulation has three shunts

- Inter-atrial foramen (Right to left atrium)
- Ductus arteriosus (Pulmonary trunk to aorta)
- Ductus venosus (Umbilical vein to IVC)
Placenta

Lower ½ Of body

Upper ½ Of body

Liver

Pulmonary circulation

Lower ½ Of body