PHYSIOLOGY TEAM 435

جامعة الملك سعود
King Saud University

Physiology
OF THE CARDIOVASCULAR SYSTEM

Coronary Circulation

Coronary Circulation

Arterial supply

Right coronary artery (RCA)

- Smaller than the left coronary artery
- Arises from the right coronary sinus
- Terminates by anastomosing with the left coronary artery
- *Branches:
  - Marginal Artery.
  - Posterior Descending Branch.
- *RCA Supplies:
  - -Right atrium.
  - -Ventricles:
    1. Greater part of Rt ventricle, except the area adjoining the anterior inter ventricular groove.
    2. Inferior part of Lt ventricle adjoining the posterior inter ventricular groove.
  - -Posterior 1/3rd of the inter ventricular septum.
  - -The conducting system of the heart, except:
    1. A part of the Lt branch of AV- Bundle.
    2. The SA- node is supplied by the LCA in 40% of cases.

Left coronary artery (LCA)

- Larger than the right coronary artery
- Arises from the left coronary sinus
- Terminates by anastomosing with the right coronary artery
- *Branches:
  - Left Anterior Descending (LAD.)
  - Marginal Artery.
  - Circumflex Artery (CX.)
- * LCA Supplies:
  - Anterior & apical parts of the heart.
  - Anterior 2/3rd of the inter ventricular (IV) septum.
- * CX branch supplies:
  - Lateral & posterior surfaces of the heart.

Both LCA & RCA arise from the coronary sinuses just superior to the aortic valve cusps at the aortic root.

Collateral Circulation
-Cardiac anastomosis:
.The two coronary arteries anastomose in the myocardium.
-Extra cardiac anastomosis: the two coronary arteries anastomose with,
1. Vasa vasorum of the aorta.
2. Vasa vasorum of pulmonary arteries.
3. Internal thoracic arteries.
4. The bronchial arteries.
5. Phrenic arteries.
-Extra cardiac channels open up in emergencies when the coronary arteries are blocked.

The aortic valve has three cusps: left coronary (LC), right coronary (RC), & posterior non-coronary (NC) cusps

There may be variations in the number, shape & location of coronary ostia or origins of the coronary arteries, most of which are of no clinical significance

Coronary arteries deliver oxygenated blood to the cardiac muscle.

Venous drainage

Venous drainage brings deoxygenated cardiac blood back to the heart

Cardiac venous drainage occur through:
- Coronary sinus, which lies in the posterior part of the atrioventricular groove & is a continuation of the great cardiac vein.
- Anterior, middle & small cardiac veins.
- Venae Cordis Minimae (smallest cardiac veins.)

Most of the venous blood return to the heart into the Rt atrium through the coronary sinus via the cardiac veins.

5- 10% drains directly into heart chambers, Rt atrium & Rt ventricle, by the anterior cardiac vein & by the small veins that open directly into the heart chambers.

Lymphatic drainage

Lymphatics of the heart accompany the two coronary arteries & form two trunks:
- The right trunk, ends in the brachiocephalic node.
- The left trunk, ends into the tracheo-bronchial lymph nodes at the bifurcation of the trachea

Coronary Dominance

A person can be:
- Right dominant,
- Left dominant, or
- Co-dominant.

Coronary dominance depends on which artery (or arteries) gives rise to the posterior descending artery (PDA), which runs along the posterior side of the heart & supplies the AV-node.

Coronary dominance is recognized by the presence of septal perforating branches arise from:
- The right coronary artery is dominant, in 80–85% cases.
- The circumflex branch of the left coronary artery, in 8-10% cases.

balanced or co-dominance is found in 7-10% of population where the posterior inter ventricular artery is formed by both Rt coronary & LCX arteries.

Clinical importance:
- In Lt dominance, a block in LCA affect the entire Lt ventricle & IV septum.
- In Rt or balances dominance, a block in RCA at least spares part (2/3) of the septum & Lt ventricle.