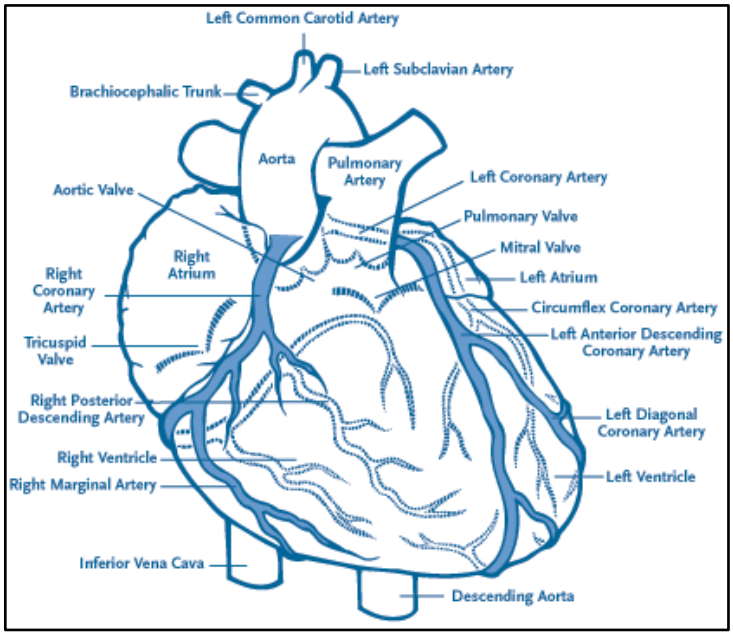
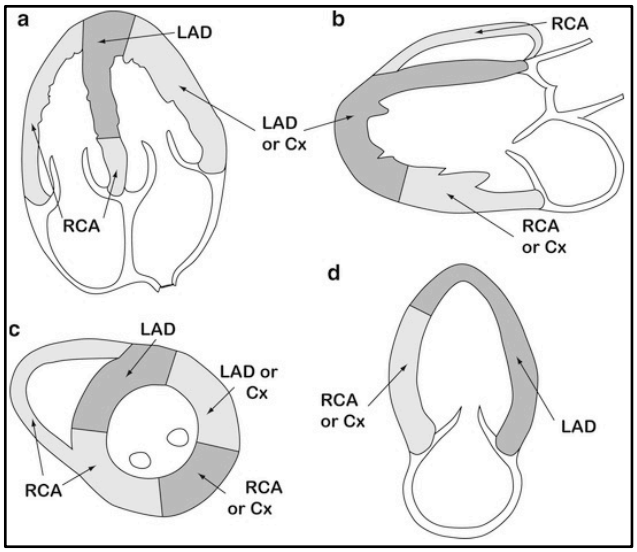
Coronary Anatomy

Anesthetic Pearls: Anesthetic Implications of Coronary Vascular Anatomy

The heart is supplied by the left and right coronary arteries, which arise from the left and right aortic sinuses, respectively. The left coronary artery (LCA) travels laterally behind the pulmonary artery for a very short distance before it divides into the larger left anterior descending artery (LAD) and the smaller left circumflex artery (CX). The LAD passes along the anterior interventricular groove to the apex of the heart. Here, the LAD turns around the inferior border of the heart and junctions with the posterior descending artery (PDA) with is a branch of the right coronary artery (RCA). The LAD supplies the anterior wall of the left ventricle and the anterior two-thirds of the interventricular septum. The CX of the LCA follows the coronary groove around the left border of the heart and gives rise to the marginal branches. The CX continues traveling posterior to the heart, giving off branches to the left atrium and ventricle, and finally junctions with the end of the RCA. In 20% of the population the CX gives rise to the PDA. The CX and its branches are responsible for the blood supply of the left atrium, the posterolateral surface of the left ventricle, and the base of the left ventricle inferiorly.



The RCA runs anteriorly behind the pulmonary artery in between the right atrium and ventricle. Then the RCA passes toward the inferior border of the heart, where it gives off the right marginal branch that runs toward the apex of the heart. After giving off this branch, the RCA then turns circumferentially to the left and enters the posterior interventricular septum giving off the PDA in 50% of the population. In the remaining 30% of the population, the posterior descending artery arises as a combination of the CX of the LCA and the RCA. The RCA and its branches are responsible for the blood supply of the right atrium and ventricle, the posterior one third of the interventricular septum.



The arterial supply of the SA node is either the RCA (60%) or the left circumflex artery (40%). The AV node is usually supplied by the atrioventricular nodal artery of the RCA (90%). However, the CX of the LCA may also give rise to this artery in approximately 10% of the population. Cardiologists and Radiologists define left or right coronary artery dominance as denoting which artery supplies the greatest portion of blood to the base of the left ventricle.

The venous return from the coronary arteries returns to the heart via the coronary sinus which runs posteriorly in the atrioventricular groove. The ostia of the coronary sinus enters the right atrium immediately superior to the tricuspid valve.

Complete interruption of a coronary artery with infarction of the myocardium results in a Q-wave in the EKG leads representing the infracted area. The RCA is represented by EKG leads II, III, and a VF. An infarct in this area is referred to as inferior infarct or diaphragmatic infarction. A posterior infarct represented by abnormalities in leads VI, V2, and V3 is also generally due to an occlusion of the RCA or one of its smaller branches. Leads VI-V4 represent the anterior aspect of the myocardium. Thus an infarct in this area (anterior infarct) is usually caused be the occlusion of the left anterior descending artery. The CX of the LCA supplies the lateral aspect of the left ventricle and an infarction in this area is represented by abnormalities in leads I, aVL, V5, and V6.