Coronary Artery Blockage and Heart Attack

COLUMN ARTICLE

The following is a simplified presentation of the next research project, which aims to determine the common site of blockages of coronary arteries and its branches in the heart and I think that, this study will play an active role in the treatment immediately before the myocardial infarction.

The coronary arteries carrying oxygen and nutrients to supply the all parts of the cardiac muscle and normally implanted in fatty tissue. The coronary arteries (right and left) arise from the proximal part of the ascending aorta.

The right coronary artery (RCA) arises from the anterior aortic sinus and passes forwards between the pulmonary trunk and the right atrium to descend in the right part of the atrioventricular groove. At the inferior border of the heart it continues along the atrioventricular groove to anastomose with the left coronary at the posterior interventricular groove. It gives off a marginal branch along the lower border of the heart and the posterior interventricular branch which runs forward in the inferior interventricular groove and to anastomose near the apex of the heart with the corresponding branch of the left coronary artery [1].

Specifically, the RCA supplies: the right atrium, most of the right ventricle, diaphragmatic surface of the left ventricle, the posterior third interventricular (IV) septum, the sinoatrial (SA) node almost 60% of people and the atrioventricular (AV) node almost 80% of people (Figure 1).

The left coronary artery (LCA), which is larger than the right, rises from the left posterior aortic sinus. Passing first behind and then to the left of the pulmonary trunk, it reach-
es the left part of atrioventricular groove in which it runs laterally round the left border of the heart as the circumflex artery to reach the posterior interatrial groove. Its most important branch, given off about 2 cm from its origin, is the anterior interventricular artery which supplies the anterior aspect of both ventricles and passes around the apex of the heart to anastomose with the posterior interventricular branch of the right coronary. Note that the sinoatrial node is usually supplied by the right coronary artery, although the left coronary artery takes over this duty in about one-third of subjects. Although anastomoses occur between the terminations of the right and left coronary arteries, these are usually inefficient. Thrombosis in one or other of these vessels leads to death of the area of heart muscle supplied (a myocardial infarction) \[1\].

Specifically, the LCA supplies: the left atrium, most of the left ventricle, part of the right ventricle, anterior two thirds of the IV septum, including the atrioventricular (AV) bundle of conducting tissue, IV septal branches and the SA node almost 40% of people add to the cells of cardiac muscle. Their function specialized for introducing impulses and directing them rapidly through the heart. They initiate the normal cardiac cycle and manage the contractions of cardiac chambers.

The anatomical structures of the conducting system were: sinoatrial node (SA node), atrioventricular node (AV node), atrioventricular bundle (AN bundle), right and left atrioventricular branches (RAV + LAV branches) and Purkinje fibers.

Regarding the anatomy variation of coronary arteries reported by Koşar., et al. the coronary artery system was right dominant in 76%, left dominant in 9.1% and co-dominant in 14.8% of the cases. Ramus intermedius was present in 31%. Conus artery with a separate ostium in the right sinus Valsalva was observed in 22%, and in 0.2% two conus arteries originating with separate ostia were visualized. The sinus node artery (SNA) originated from the right coronary artery (RCA) in 79%, from the circumflex artery (Cx) in 20%, and from the left main coronary artery (LMCA) in 0.4%. In 0.4% of the cases SNA originating from the right sinus Valsalva with a separate ostium was seen. LMCA was absent in 0.4%. Cx was absent in 0.1%, and diagonals were absent in 0.1%. High takeoff of LMCA and RCA were observed in 0.7% and 0.1%, respectively. Myocardial bridging was observed in 37%. Anomalous origin of the coronary artery from the opposite sinus was observed in 1% of the cases \[2\].

Coronary artery blockage develops when the coronary arteries that supply the heart with blood, oxygen and nutrients become damaged or diseased. Cholesterol-containing deposits in the arteries and inflammation were a common risk for coronary artery disease. When plaque builds up, it narrows the coronary arteries, decreasing blood flow to parts of the heart. Finally, the decreased blood flow may cause chest pain (angina), shortness of breath, or other coronary artery disease signs and symptoms. A complete blockage can cause a heart attack.

Damage to the conduction system, frequently resulting from ischemia caused by coronary artery blockage, produces disturbances of cardiac muscle contraction. Because the anterior IV branch (LAD branch) supplies the AV bundle in most people and because branches of the RCA supply both the SA and the AV nodes, parts of the conducting system of the heart are likely to be affected by their occlusion. Damage to the AV node or bundle results in a heart block because the atrial impulse does not reach the ventricles. Damage to one of the bundle branches results in a bundle

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branch block, in which excitation passes along the unaffected branch and causes a normally timed systole of that ventricle only. The impulse then spreads to the other ventricle, producing a late asynchronous contraction [3].

Cardiac pain originating in the heart as the result of acute myocardial ischemia is assumed to be caused by oxygen deficiency and the accumulation of metabolites, which stimulate the sensory nerve endings in the myocardium. The pain is not felt in the heart, but refers to the skin areas supplied by the corresponding spinal nerves. The skin areas supplied by the upper four intercostal nerves and by the intercostobrachial nerve (T2) are therefore affected. The intercostobrachial nerve communicates with the medial cutaneous nerve of the arm and is distributed to the skin on the medial side of the upper part of the arm. A certain amount of spread of nervous information must occur within the central nervous system, for the pain is sometimes felt in the neck and the jaw. Myocardial infarction involving the inferior wall or diaphragmatic surface of the heart often gives rise to discomfort in the epigastrium. One must assume that the afferent pain fibers from the heart ascend in the sympathetic nerves and enter the spinal cord in the posterior roots of the seventh, eighth, and ninth thoracic spinal nerves and give rise to referred pain in the T7, T8 and T9 thoracic dermatomes in the epigastrium. Because the heart and the thoracic part of the esophagus probably have similar afferent pain pathways, it is not surprising that painful acute esophagitis can mimic the pain of myocardial infarction [4].

I recommended you and because coronary artery disease often develops over years, you might not notice a problem till you have a significant blockage or a heart attack. But there’s sufficiently you can do to avoid coronary artery disease. A healthy lifestyle can make a big impact.

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BIBLIOGRAPHY


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