ANATOMY OF CARDIOVASCULAR SYSTEM

Azizova Shoira Kayumovna

Samarkand State Medical University,

Assistant of the Department of Internal Medicine propaedeutics

Annotation: The article covers information about anatomy of cardiovascular system, its structure and main function. Moreover, close connection of cardiovascular system with other systems were highlighted in the article.

Key words: *muscular pumping organ, the pulmonary, oxygen, the vessel, capillaries, veins, subclavian artery, exchange gases, nutrients, active tissues.*

The cardiovascular system includes the heart, blood vessels, and the around 5 liters of blood that moves through the vessels. The cardiovascular system sends oxygen, nutrients, and other things around the body. It is powered by the heart, which is small, but works very hard. Even when you are not doing anything, your heart pumps more than 5 liters of the blood every minute to all part of your body. The heart is a strong muscle that pumps blood. It's found in the middle of the body, next to the lungs, in the chest area. The end of the heart is called the apex and it leans to the left. This means that most of the heart is on the left side of the body and a little bit is on the right side. The heart's top part is called the base.

It links to the body's big blood vessels, such as the aorta, vena cava, pulmonary trunk, and pulmonary veins. The human body has 2 main loops for blood flow: one for the lungs and another for the rest of the body.

Pulmonary circulation transports deoxygenated blood from the right side of the heart to the lungs, where the blood picks up oxygen and returns to the left side

of the heart. The pumping chambers of the heart that support the pulmonary circulation loop are the right atrium and right ventricle. Systemic circulation carries highly oxygenated blood from the left side of the heart to all of the tissues of the body (with the exception of the heart and lungs). Systemic circulation removes wastes from body tissues and returns deoxygenated blood to the right side of the heart. The left atrium and left ventricle of the heart are the pumping chambers for the systemic circulation loop. Blood vessels are the body's highways that allow blood to flow quickly and efficiently from the heart to every region of the body and back again. The size of blood vessels corresponds with the amount of blood that passes through the vessel. All blood vessels contain a hollow area called the lumen through which blood is able to flow. Around the lumen is the wall of the vessel, which may be thin in the case of capillaries or very thick in the case of arteries[1].

All blood vessels are lined with a thin layer of simple squamous epithelium known as the endothelium that keeps blood cells inside of the blood vessels and prevents clots from forming. The endothelium lines the entire circulatory system, all the way to the interior of the heart, where it is called the endocardium. There are three major types of blood vessels: arteries, capillaries and veins. Blood vessels are often named after either the region of the body through which they carry blood or for nearby structures. For example, the brachiocephalic artery carries blood into the brachial (arm) and cephalic (head) regions. One of its branches, the subclavian artery, runs under the clavicle; hence the name subclavian. The subclavian artery runs into the axillary region where it becomes known as the axillary artery. Arteries are blood vessels that carry blood away from the heart. Blood carried by arteries is usually highly oxygenated, having just left the lungs on its way to the body's tissues.

The pulmonary trunk and arteries of the pulmonary circulation loop provide an exception to this rule — these arteries carry deoxygenated blood from the heart

to the lungs to be oxygenated. Arteries face high levels of blood pressure as they carry blood being pushed from the heart under great force. To withstand this pressure, the walls of the arteries are thicker, more elastic, and more muscular than those of other vessels[2]. The largest arteries of the body contain a high percentage of elastic tissue that allows them to stretch and accommodate the pressure of the heart. Smaller arteries are more muscular in the structure of their walls. The smooth muscles of the arterial walls of these smaller arteries contract or expand to regulate the flow of blood through their lumen. In this way, the body controls how much blood flows to different parts of the body under varying circumstances. The regulation of blood flow also affects blood pressure, as smaller arteries give blood less area to flow through and therefore increases the pressure of the blood on arterial walls. Arterioles are narrower arteries that branch off from the ends of arteries and carry blood to capillaries. They face much lower blood pressures than arteries due to their greater number, decreased blood volume, and distance from the direct pressure of the heart. Thus arteriole walls are much thinner than those of arteries. Arterioles, like arteries, are able to use smooth muscle to control their aperture and regulate blood flow and blood pressure.

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Precapillary sphincters are bands of smooth muscle found at the arteriole ends of capillaries. These sphincters regulate blood flow into the capillaries. Since there is a limited supply of blood, and not all tissues have the same energy and oxygen requirements, the precapillary sphincters reduce blood flow to inactive tissues and allow free flow into active tissues. Veins are the large return vessels of the body and act as the blood return counterparts of arteries. Because the arteries, arterioles, and capillaries absorb most of the force of the heart's contractions, veins

and venules are subjected to very low blood pressures. This lack of pressure allows the walls of veins to be much thinner, less elastic, and less muscular than the walls of arteries[4]. Veins rely on gravity, inertia, and the force of skeletal muscle contractions to help push blood back to the heart. To facilitate the movement of blood, some veins contain many one-way valves that prevent blood from flowing away from the heart. As skeletal muscles in the body contract, they squeeze nearby veins and push blood through valves closer to the heart.

To sum up it should be noted that several functions of the cardiovascular system can control blood pressure. Certain hormones along with autonomic nerve signals from the brain affect the rate and strength of heart contractions. Greater contractile force and heart rate lead to an increase in blood pressure. Blood vessels can also affect blood pressure. Vasoconstriction decreases the diameter of an artery by contracting the smooth muscle in the arterial wall. The sympathetic (fight or flight) division of the autonomic nervous system causes vasoconstriction, which leads to increases in blood pressure and decreases in blood flow in the constricted region. Vasodilation is the expansion of an artery as the smooth muscle in the arterial wall relaxes after the fight-or-flight response wears off or under the effect of certain hormones or chemicals in the blood. The volume of blood in the body also affects blood pressure. A higher volume of blood in the body raises blood pressure by increasing the amount of blood pumped by each heartbeat. Thicker, more viscous blood from clotting disorders can also raise blood pressure.

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