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INTERNAL MORPHOLOGY OF THE HEART, BASEMENT VESSELS AND TYPES OF CIRCULATION: LITERATURE REVIEW

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Abstract: INTRODUCTION: The heart is one of the most important and complex structures in the human body. From it, other structures and organs are nourished with oxygen, for example. In this context, arteries, arterioles, veins, venules and capillaries contribute to this mechanism for the exit of oxygen-rich blood from the heart and the return of the same blood, but poor in O2, which enters the right ventricle and, consequently, is pumped to the pulmonary arteries, leading to the lungs. This way, venous blood travels through capillaries and arterioles to perform hematosis and become oxygenated again. **OBJECTIVES:** Address the internal morphological issues of the heart, as well as understand the importance of the basal vessels and the types of circulation. **METHODS:** This is an integrative literature review study based on the guiding question: "What are the internal morphological structures of the heart?"; "What is the relationship of the basal vessels with the types of circulation?". The descriptors: "heart", "morphology", "functionality" and "anatomy" were used to locate the articles in the databases. Virtual and physical books were included, as well as articles in Portuguese and English published from 2014-2021 and letter-type studies were excluded. The snowball strategy was used to capture new evidence. **DISCUSSION:** The heart is a striated skeletal muscle whose main function is to contract involuntarily and rhythmically, this is responsible for maintaining homeostasis and life. Its structures are directly linked to a synchrony of work, taking blood throughout the body. Although, pathologies such as Systemic Arterial Hypertension (SAH), Acute Myocardial Infarction (AMI) and heart failure can compromise the proper functioning of the heart, vessels and other structures. **CONCLUSION:** This way, the importance and the need for the cardiac structure to function in balance with this entire network

of base and circulation vessels is understood.

Keywords: Anatomy. Heart. Morphology. Functionality.

INTRODUCTION

The heart is a muscular organ in the shape of a rounded cone located in the mediastinum, it is located obliquely and has 04 margins: a base, an apex, diaphragmatic and sternocostal faces. On the inside, below the sternocostal surface, on the anterior wall, we find the right ventricle and a small portion of the left ventricle wall. The left ventricle ends at the apex of the heart, and the boundary between the ventricles is located in the anterior interventricular sulcus, where it is possible to find a branch of the left coronary artery and the accompanying vein. The right side has the right atrium and the superior vena cava, forming the outline of the heart, with no visualization of the inferior vena cava from the anterior view. The right atrium has a saccular expansion, called the right atrium, it is located between the superior vena cava and the aorta and is separated from the right ventricle through the coronary sulcus, also composed of vessels and adipose tissue. The left side has a portion of the left atrium, which is located close to the division of the pulmonary trunk, and the left ventricle, making the outline of the heart.

MATERIALS AND METHODS

This is an integrative literature review. The research question was defined by: "What is the internal morphology of the heart, its basal vessels and, also, what are its types of circulation?". The review was conducted in the databases of the virtual and physical library of Faculdade Tiradentes by books, also physical and virtual. The descriptors used were "anatomy", "heart" and "morphology" combined with the logical operator "AND" inclusion criteria for the research: 1-Observational studies, case report; 2-Books and articles published in the year 2018-2021; 3- Books published in English, Spanish or Portuguese. The following were excluded: 1- Repeated books in the database; 2- Letters to the reader or editorial comments; 3- Books that did not address the subject in its entirety.

In the initial stage, a search was carried out and, later, selection through reading, in general, to analyze whether the study/book would be included or not. Furthermore, those who were included had their reading critically, in order to reduce the risk of methodological bias.

Thus, during the construction of the article, the internal morphology of the heart, as well as the vessels of the base, and also the types of circulation that act in the region of the heart itself were highlighted in detail.

RESULTS AND DISCUSSION

INTERNAL MORPHOLOGY OF THE HEART

RIGHT ATRIUM

The right atrium forms the right border of the heart and receives systemic venous blood from the superior vena cava and also from the inferior vena cava, in addition to receiving blood drained from the heart through the coronary sinus, located between the right atrioventricular ostium and the left atrioventricular ostium. superior vena cava. In addition, the right atrium has an additional chamber with the function of increasing atrial capacity, known as the right atrium. In the left region of the right atrium, it is possible to find the interatrial septum, whose function is to separate the atria from each other. In this interatrial septum, we can see the presence of an oval depression called fossa ovale, in which it is identified as foramen ovale in the period when the individual is still a fetus. There is also a smooth wall in the posterior region, where it is possible to locate both the inferior and superior vena cava sinuses, as well as the

coronary sinus. In the anterior wall, there is a rough muscular wall, formed by the pectineus muscles. In addition, it has an atrioventricular ostium, called the right atrioventricular ostium, whose function is to transfer poorly oxygenated blood located in the right atrium to the right ventricle (MOORE, 2018).

RIGHT VENTRICLE

The right ventricle receives blood from the right atrium through the tricuspid valve and then pumps this blood to the lungs through the pulmonary valve. In addition, it has in its structural composition the supraventricular crest and the septomarginal trabecula, located in the postero-inferior portion of the filling chamber and anterosuperior to the ejection chamber. In the filling chamber it is possible to visualize the trabeculae carneae, located prominently towards the interior of the chamber. Thus, blood is able to flow from the atrioventricular ostium, through the atrioventricular valve, where it leaves the right atrium and enters the filling chamber of the right ventricle. This atrioventricular valve consists of three valves that are fixed by the chordae tendineae located in the papillary muscle. These papillary muscles can be considered a form of trabeculae carneae, in which the anterior and posterior papillary muscles have a constant location, but the septal papillary muscle is variable. Another structure found in the right ventricle is the ejection chamber, in which the conus arteriosus is found, which has a smooth wall and has the function of directing blood flow towards the pulmonary trunk ostium, which is the opening of the trunk valve. pulmonary. This pulmonary trunk valve has three semilunar valves (MOORE, 2018).

LEFT ATRIUM

Most of the base of the heart is formed by the left atrium. In the region of the smooth wall, which is located posteriorly, it is possible to find the ostia of the four pulmonary veins, two superior and two inferior. In addition, in part of its wall, the presence of tubular muscle with trabecular regions in association with the pectineus muscles is notorious. On the left, there is a semilunar depression in the interatrial septum, which indicates the floor of the fossa ovale with an adjacent crest, being the valve of the foramen ovale. In addition, it has the left atrioventricular ostium, in which it is possible to transfer the highly oxygenated blood received through the pulmonary veins, unlike the right atrium, which is poorly oxygenated, to the left ventricle (MOORE, 2018).

LEFT VENTRICLE

The left ventricle forms the apex of the heart, almost the entire face and left margin, and most of the diaphragmatic face. Its interior is twice as thick as that of the right ventricle, which is covered by trabeculae carneae that are thinner than that of the right ventricle. Its cavity compared to the right ventricle is more conical and is longer. The papillary muscles are larger. In addition, it has a part of the superior outlet, the aortic vestibule, leading from the cavity of the ventricle to the aortic ostium and the aortic valve. Inside it contains an atrioventricular (mitral) valve that has two valves that guard the left atrioventricular ostium. This aortic ostium is located in the right posterosuperior part and is surrounded by a fibrous ring to which the right, posterior and left valves of the aortic valve are attached. The ascending part of the aorta begins at the aortic ostium (MOORE, 2018).

VASES OF THE BASE

The vessels at the base of the heart are known as the great vessels, they have this nomenclature in reflection of their location, in the heart base, more specifically

divided between the superior and middle mediastinum. They are responsible for taking and bringing blood to the heart, they are divided and named into the arch of the aorta artery and its main branches, known as the brachiocephalic trunk, left common carotid artery and left subclavian artery, in addition to the superior and inferior vena cava and the four pulmonary veins (MOORE; DALLEY, 2019).

The brachiocephalic veins carry blood from the head, neck, and upper limbs to the right atrium. They are formed by the union of the internal jugular and subclavian veins that occur posterior to the sternoclavicular joints. In addition, the brachiocephalic veins unite to form the superior vena cava, this union occurs at the level of the inferior border of the first right costal cartilage (MOORE; DALLEY, 2019).

The superior vena cava coordinates blood from all structures above the diaphragm except the lungs and heart. It lies on the right side of the superior mediastinum, anterolateral to the trachea and posterolateral to the ascending aorta, ending at the level of the third costal cartilage, entering the right atrium of the heart. The inferior vena cava coordinates blood from structures below the diaphragm, taking blood from the trunk, lower limbs and abdominal viscera to the right atrium (MOORE; DALLEY, 2019).

Constituting the arterial system of the heart, the aorta is the main and most important artery. The aorta is divided into three parts: ascending, arch and descending. The ascending part has a diameter of approximately 2.5 cm, starting at the aortic ostium. The only branches that depart from this region of the aorta are the coronary arteries, responsible for supplying the heart. The ascending aorta is located inferior to the transverse thoracic plane, and is considered to belong to the middle and intrapericardial mediastinum. The aortic arch, moreover, is a curved continuation of the ascending aorta, which begins posterior to the second right sternocostal joint, curves posteriorly superiorly to the left and then inferiorly, forming the descending part of the aorta, posterior to the second left sternocostal joint (MOORE). ; DALLEY, 2019).

The aortic arch is subdivided into three main arteries: left common carotid artery, left subclavian artery, and brachiocephalic trunk. The brachiocephalic trunk originates in the region posterior to the sternal manubrium and is considered the largest branch of the subdivision. This vessel has a course of approximately 03 cm and is subdivided into two other arteries, the left common carotid artery and the right subclavian artery. The left common carotid artery is the second largest branch of the aortic arch and is responsible for irrigation of the neck and head, ascending superiorly and bifurcating to give rise to the left internal and external carotid arteries. This artery originates posterior to the sternal manubrium and to the left of the brachiocephalic trunk. Finally, the left subclavian artery is the third branch and is responsible for irrigation, mainly, of the upper limbs. Ascending in the superior mediastinum, lateral to the left common carotid artery and trachea (MOORE; DALLEY, 2019).

The left side of the heart receives oxygenated blood into the lungs via the pulmonary veins. The pulmonary veins pass through the left atrioventricular ostium and reach the left ventricle, where, later, it will conduct the oxygenated blood to the aorta. Furthermore, the left and right pulmonary arteries, which make up the pulmonary system, originate in the pulmonary trunk, located at the sternal angle, and are responsible for the conduction of poorly oxygenated blood from the heart to the lung (MOORE; DALLEY, 2019).

TYPES OF CIRCULATION

The circulatory system is known as a set of tubes connected to each other that has the responsibility of transporting the body's fluids. This system consists of the vascular systems of blood and lymph, and the cardiovascular system consists of the heart, vessels and blood (CARNIATTO et al., 2019).

The main function of the cardiovascular circulatory system is the transport of gases, nutrients, mineral salts and all metabolites from the body. This stems from the circulation process through the blood pumping carried out by the heart, which blood distribution is given through the blood vessels, which are: arteries, veins, arterioles, venules and capillaries. These are the components of the circulation paths. Circulation is divided into two processes: systemic circulation, also called large circulation, and pulmonary circulation, known as small circulation (TEIXEIRA, 2021).

Systemic circulation is responsible for transporting necessary and essential elements (glucose, nutrients, oxygen and hormones) to all tissues and cells in the body. While the pulmonary circulation is responsible for carrying out gas exchange, capturing oxygen and eliminating carbon dioxide (TEIXEIRA, 2021).

It is worth remembering that the heart is divided into four chambers, two left and two right. The right atrium receives blood that is poor in oxygen due to systemic circulation through the largest veins in the human body: the inferior vena cava and the superior vena cava (BRANCO, 2018). This passes from the right atrium, through the right atrioventricular (tricuspid) valve, to the right ventricle, where it is pumped to the pulmonary trunk and, soon after, to the pulmonary artery (WAUGH, GRANT, 2021).

The pulmonary trunk is divided into pulmonary arteries: right and left, which will take the oxygen-poor blood to the lungs, where blood gas exchange will occur (carbon dioxide is eliminated, and oxygen is absorbed), making the blood rich in oxygen (WAUGH, GRANT, 2021).

Soon after, the blood returns to the left heart (left atrium) through the two pulmonary veins of each lung and is then directed to the left ventricle, passing through the left atrioventricular valve. And which, in turn, is pumped back into the systemic circulation, through the aorta artery (first artery of the systemic circulation) (BRANCO, 2018).

CONCLUSIONS

Based on most of the studies and books that were used for the construction of this research, it was possible to perceive that the heart and the cardiovascular system have very important functionalities for the maintenance of the body's homeostasis and continuity of life. In addition, it is noted that, when there is an abnormality, such as injury, thrombus or even inflammation, such a process ends up impacting in favor of a dysfunction that goes from the micro to the macro scale. This way, the heart can work tirelessly, but without the help of the basal vessels and the different types of circulation, this work is not successful. The balance, therefore, depends on an entire support network and on voluntary and involuntary mechanisms.

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