



HISTORY OF THE CARDIOVASCULAR SYSTEM

Cardiology

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ABSTRACT

The history of cardiovascular system has its origin in ancient times when a papyri was found in Egypt which described the relationship between the heart and blood vessels. The description of blood circulation from autopsy techniques allowed to know that the blood flowed into the vessels. Firstly, the heart was described in separated cavities in Ancient Greece by Hipocrates. During the Roman empire, Claudius Galenus considered that the arteries carried distinct blood from the venous blood. Until the beginning of the Renaissance, the knowledge about the cardiovascular system was based mainly on assumptions. The paradigm shift between the past and the future came with the experimental models of Willian Harvey which presented the first accurate explanation of the the cardiac physiology.

KEYWORDS:

revision, cardiovascular system, history, heart, blood.

The first description of the heart in the history of humanity was found in Smith's papyrus 3000 b.C in Egypt. This document related the heart with the blood vessels and was attributed to Imhotep, considered the first physician of antiquity¹.

Fundamentals of cardiac anatomy were also described by the Chinese about 2300 years ago, which demonstrated that there was movement of blood into the vessels¹.

From ancient Greece, medical knowledge had significant enrichment. The deepening of the autopsy technique in human cadavers allowed to observe that blood circulated in channels of two types. One type carried air and was called the artery or *pneuma*, the vital spirit. The second type contained blood and received the designation of vein or *phleps*, the blood carrying tube¹.

The first description of the heart as an organ was demonstrated by the "father of medicine," the Greek Hipocrates, who taught his disciples that the heart was divided into cavities, These cavities were separated by valves and the coloring of blood differed between the right and left chambers. He also described that the blood was carried in a single vessel to all the body².

Other Greek philosophers contributed to the description of the cardiac anatomy. Aristotle described the aortic artery in details and noted that the heart was the last organ to die when its beats ceased¹. According to Aristotle, blood was formed in the liver from the food and was transported to the heart².

Herophilus, a disciple of Aristotle, described the diastole, systole and more four specific aspects of the pulse: frequency, amplitude, force, and rhythm. He was the first scholar to analyze arrhythmias.

During the Roman empire, Claudius Galenus deepened his knowledge about the cardiac anatomy from animal dissections. His most important contribution was suggest that the arteries would transport distinct blood from the venous blood. Venous blood was formed in the liver and would be taken to the right ventricle. A part of this blood would be later distributed through the systemic circulation with the functions of nutrition and growth, while the other part would pass directly through the interventricular septum to the left ventricle, which would originate the arterial blood³.

Throughout the Middle Ages, there was almost no development of the knowledge about cardiac anatomy. The concepts of Galen that defined the essential of blood circulation remained for almost a millennium. In the middle of the thirteenth century, the Arab physician Ibn al-Nafis of Damascus contradicted Galen's ideas in his most famous book *Sharh Tashrih al-Qanun Ibn Sina (Commentary on the Canon of Anatomy of Avicenna)*. Ibn al-Nafis stated that blood circulated through the lungs and not through the interventricular septum. Coronary circulation was mentioned for the first time in history as a set of small vessels that nourished the heart².

However, in the beginning of the Renaissance, important scientific advances was contemplated. The descriptions of the heart and circulatory apparatus that Leonardo da Vinci and Andreas Vesalio obtained from autopsied humans definitively put an end to the model of circulation that existed from Galen. The work of the Leonardo da Vinci allowed us to know the existence of the endocardium, valve apparatus and papillary muscles (figure 1)⁴.

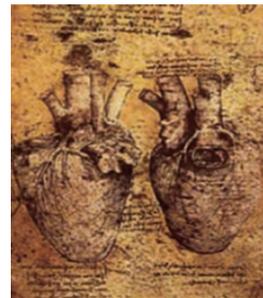


Figure 1. Sketch by Leonardo da Vinci, showing the distribution of the veins of the heart (1475 ad)¹.

During the Renaissance period, the English physician William Harvey was the one who revolutionized the knowledge on the cardiac anatomy surpassing its predecessors like Hipocrates and Leonardo da Vinci. In 1628, William Harvey presented the first accurate explanation of the nature of the cardiac circulation in his book entitled *Exercitatio Anatomica de Motu Cordis et Sanguinis in Animalibus (An Anatomical Exercise in the Movement of the Heart and Blood in Living Things)*⁵⁻⁷. William Harvey emphatically considered that the heart was a muscle capable of ejecting blood into the vessels⁵.

This knowledge of the circulatory system overcame the teachings of Galen and his predecessors. His findings were also supported by intense autopsy research. Willian Harvey demonstrated the true nature of the circulation and the function of the leaflets. He considered that there was no flow through the septum of the heart, but rather that the blood stream flowed through the lung parenchyma^{1,6}.

William Harvey's discoveries were precursors of the modern science and of the paradigm shift between the assumptions of antiquity and the current model of experimental research.

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