



THORACIC AND ABDOMINAL AORTA: MAIN BRANCHES, BLOOD SUPPLY TO INTERNAL ORGANS

Gaipova Shaxrizoda Maxmudovna

Zoirxo'jayev Sobirxuja Murodxuja ugli

Students of the 1st year group 105-b of the Faculty of Dentistry of
the Tashkent State Dental Institute

Khalilov Sanjar Abdivohid ugli

Assistant teacher of the Department of Anatomy of the Tashkent
State Dental Institute

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ABSTRACT

The aorta is the first segment of the systemic arterial circulation, originating directly from the left ventricle of the heart. It is the largest artery in the body consisting of three parts that each has its special characteristics, most notably in their direction and orientation. At the beginning of its course, the aorta runs upwards as the ascending aorta then shortly after arches laterally to the left, forming the arch of aorta. After that, the aorta continues downwards as the descending aorta until it divides into its terminal branches.

The aorta is the main artery in the body and its sole and important function is to transport oxygenated blood from the heart to the rest of the body. It should be noted that all arteries of the human body (except the pulmonary arteries), regardless of where they are, receive blood from the aorta. This is possible due to the large number of branches that the aorta gives off along its course.

Being the first segment of the systemic circulation, the aorta originates directly from the heart. It begins from the aortic orifice found at the base of the left ventricle. It is separated from the ventricle by the aortic valve, which consists of three semilunar cusps; the right, left and posterior cusp. The aorta is approximately 30 cm long, spanning almost the entire length of the trunk. It is the largest artery in the body, with its largest diameter being approximately 4 cm at the aortic root decreasing with distance; being about 3.5 cm in the ascending aorta, and about 2.5 cm in the abdominal aorta. The main function of the aorta is to transmit oxygenated blood from the heart to the rest of the body.

There are a number of classifications of the aorta. The most common one, and the one we will use in this article, is the classification of the aorta into three parts; the ascending aorta, aortic arch and the descending aorta. The descending aorta is the longest part, further subdivided into thoracic and abdominal aorta, with the diaphragm being the anatomical division between the two.

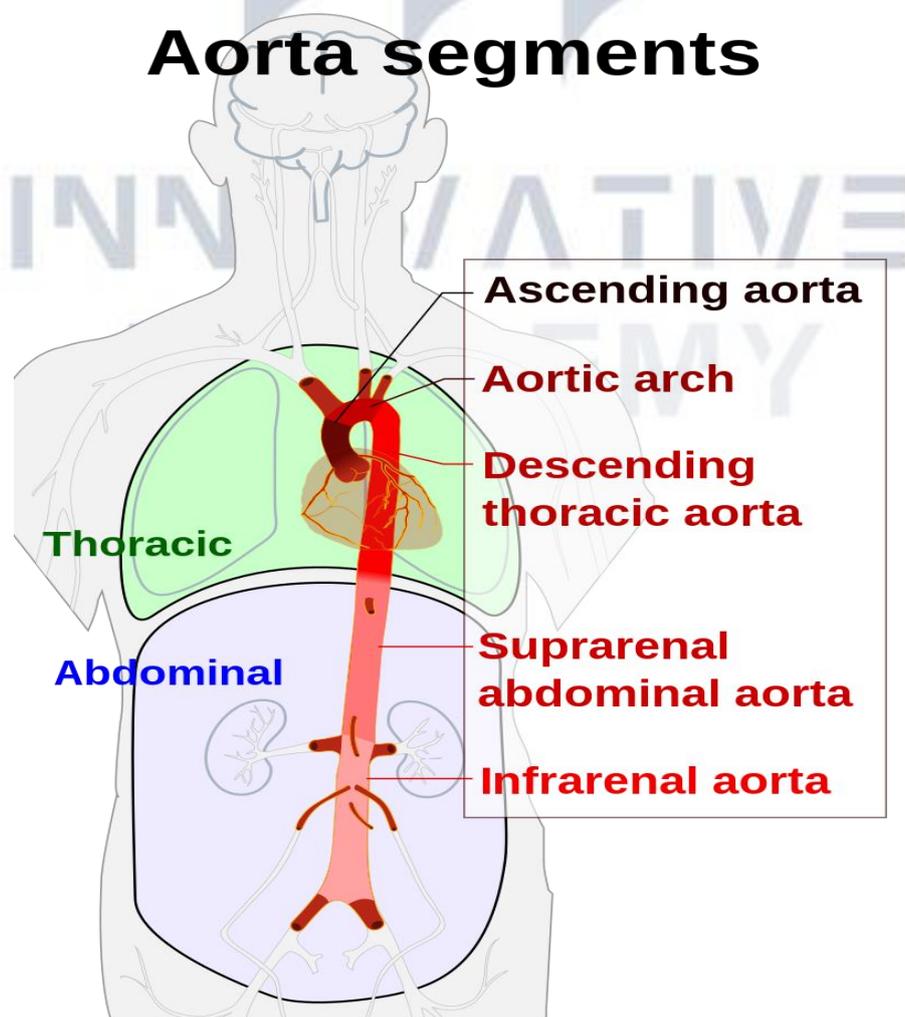
Some authors use the term "descending aorta" to describe the thoracic aorta, and hence use the classification which recognizes four parts of the aorta; the ascending aorta, aortic arch, descending aorta, and abdominal aorta.

In addition, the ascending aorta, aortic arch and the thoracic part of the descending aorta are sometimes together referred to as the thoracic aorta, due to all of them being confined to the thoracic cavity. This classification describes the aorta as having two parts; the thoracic and abdominal aorta.

Along with the heart, the ascending aorta is located in the inferior mediastinum. The ascending aorta is completely enclosed by the pericardium together with the pulmonary trunk. These two vessels initially run in parallel, with the infundibulum of the pulmonary trunk lying anterior to the ascending aorta. Soon after, the pulmonary trunk and the ascending aorta twist around each other so that the ascending aorta ends up being anterior.

Posterior relations of the ascending aorta include the left atrium and pulmonary trunk on the left, and right pulmonary artery and principal bronchus on the right. Laterally to the right is the superior vena cava, and the right atrium, and laterally to the left is the left atrium and the pulmonary trunk. Superiorly, the ascending aorta communicates with the remaining tissue of the thymus gland, the sternum, the right pleura, and the anterior margin of the right lung.

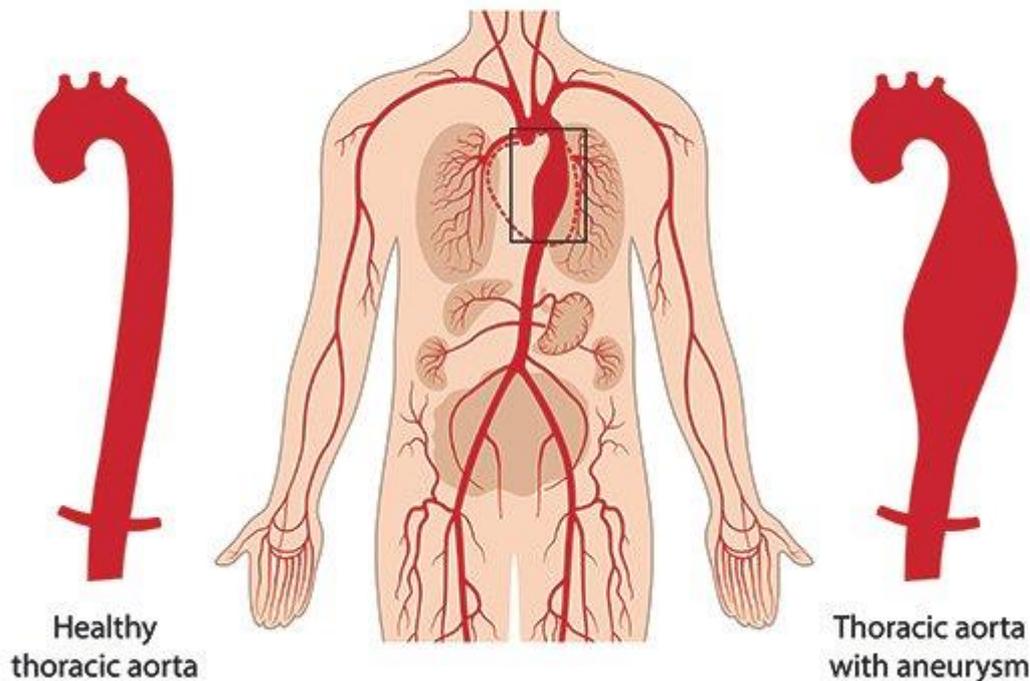
The descending aorta is the largest part of the aorta. It arises as a continuation of the aortic arch after the branching of the left subclavian artery. As previously mentioned, the descending aorta is divided into the thoracic aorta and the abdominal aorta, which are anatomically separated by the diaphragm.



Thoracic aorta

The thoracic aorta begins at the level of the T4 vertebra and courses downwards through the posterior mediastinum. Initially, it is found left to the vertebral column, but as it descends it inclines towards the midline and ends up being anterior to the lower border of the body of the T12 vertebra. At this level, it transitions into the abdominal aorta and passes through the aortic orifice of the diaphragm into the abdominal cavity.

Thoracic Aortic Aneurysm



The thoracic aorta is part of the descending aorta, which has different parts named according to their structure or location. The thoracic aorta is a continuation of the descending aorta and becomes the abdominal aorta when it passes through the diaphragm. The initial part of the aorta, the ascending aorta, rises out of the left ventricle, from which it is separated by the aortic valve. The two coronary arteries of the heart arise from the aortic root, just above the cusps of the aortic valve. The aorta then arches back over the right pulmonary artery. Three vessels come out of the aortic arch: the brachiocephalic artery, the left common carotid artery, and the left subclavian artery. These vessels supply blood to the head, neck, thorax and upper limbs.

Behind the descending thoracic aorta is the vertebral column and the hemiazygos vein. To the right is the azygos veins and thoracic duct, and to the left is the left pleura and lung. In front of the thoracic aorta lies the root of the left lung, the pericardium, the esophagus, and the diaphragm.

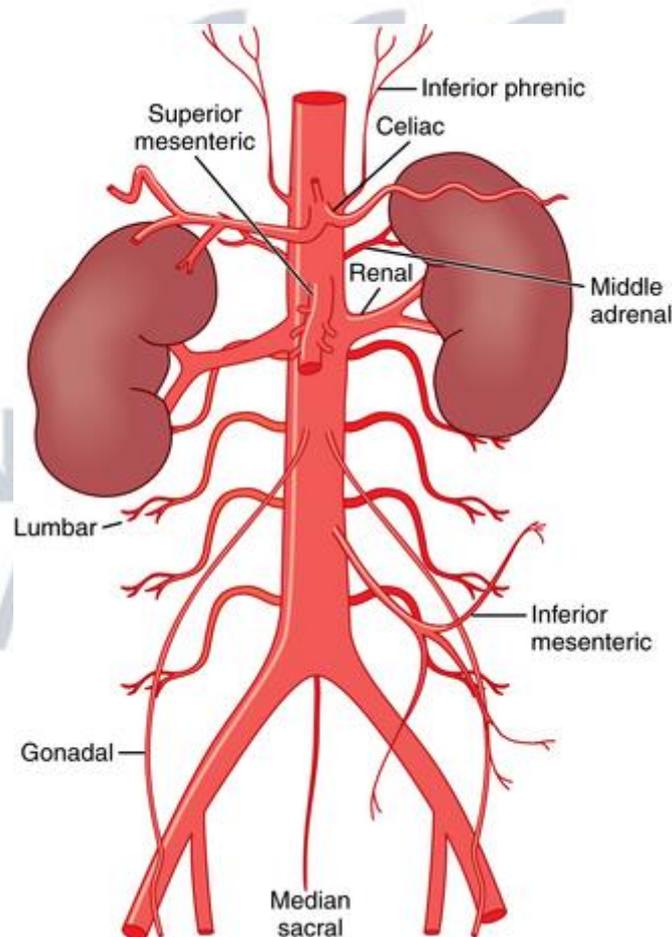
The esophagus, which is covered by a nerve plexus, lies to the right of the descending thoracic aorta. Lower, the esophagus passes in front of the aorta, and ultimately is located on the left.

The abdominal aorta

The abdominal aorta begins at the level of the diaphragm, crossing it via the aortic hiatus, technically behind the diaphragm, at the vertebral level of T12.[1] It travels down the posterior wall of the abdomen, anterior to the vertebral column. It thus follows the curvature of the lumbar vertebrae, that is, convex anteriorly. The peak of this convexity is at the level of the third lumbar vertebra (L3). It runs parallel to the inferior vena cava, which is located just to the right of the abdominal aorta, and becomes smaller in diameter as it gives off branches. This is thought to be due to the large size of its principal branches. At the 11th rib, the diameter is 122mm long and 55mm wide and this is because of the constant pressure.[2] The abdominal aorta is clinically divided into 2 segments:

The suprarenal abdominal or paravisceral segment, inferior to the diaphragm but superior to the renal arteries.

The infrarenal segment, inferior to the renal arteries and superior to the iliac bifurcation.



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