

BOGOMOLETS NATIONAL MEDICAL UNIVERSITY
DEPARTMENT OF HUMAN ANATOMY

Guidelines

<i>Academic discipline</i>	HUMAN ANATOMY
<i>Module N^o</i>	2
<i>Topic of the lesson</i>	Aorta. Thoracic aorta.
<i>Course</i>	1
<i>The number of hours</i>	3

1. The relevance of the topic

1. Aorta—the biggest vessel of the big circulatory system. It takes part in a blood supply, as all the arteries, that form a big circulatory system, branch out of it. Because of the daily loads a big amount of diseases can develop in this vessel, so the knowledge of aorta's placement is necessary for future diagnosing and right choice of cure of such a pathologies as:

- Thoracic aortic aneurism (weakened area in the upper part of the aorta). The relevant problem of the vascular surgery and anesthesiology. The lethality from the aneurism rupture is between 70 and 90%.
- Atherosclerosis—firstly struck aorta then heart arteries (causes heart attack), brain arteries (insult) and other vessels.
- Aortic coarctation—congenital abnormality, whereby aorta is narrow.

2. Specific objectives:

After the class the student should:

- demonstrate on the preparation and describe the parts of aorta;
- describe large and small circles of blood;
- describe aorta's sections and branches, show them on preparation;
- know the variants of aorta's ramification;
- classify the branches of thoracic aorta;
- describe and demonstrate on the preparation splanchnic branches of thoracic aorta (broncheal, esophageal, mediastinal)
- describe and demonstrate on the preparation parietal branches of thoracic aorta (upper diaphragmatic, rear intercostal arteries)

3. The list of practical skills:

Aorta

- Ascending part of aorta
- Aortic arch
- Brachiocephalic trunk
- Left and right subclavian arteries
- Left and right common carotid arteries
- Descending part of aorta
- Thoracic part of aorta
- Abdominal part of aorta
- Splanchnic branches (broncheal, esophageal, mediastinal)
- Parietal branches (upper diaphragmatic, rear intercostal arteries)

The content of the topic

The aorta is the largest artery in the body, initially being an inch wide in diameter. It receives the cardiac output from the left ventricle and supplies the body with oxygenated

blood via the systemic circulation.

The aorta can be divided into four sections: the ascending aorta, the aortic arch, the thoracic (descending) aorta and the abdominal aorta. It terminates at the level of L4 by bifurcating into the left and right common iliac arteries.

The ascending aorta arises from the aortic orifice from the left ventricle and ascends to become the aortic arch. It is 2 inches long in length and travels with the pulmonary trunk in the pericardial sheath.

Branches

The left and right aortic sinuses are dilations in the ascending aorta, located at the level of the aortic valve. They give rise to the left and right coronary arteries that supply the myocardium.

The aortic arch is a continuation of the ascending aorta and begins at the level of the second sternocostal joint. It arches superiorly, posteriorly and to the left before moving inferiorly.

The aortic arch ends at the level of the T4 vertebra. The arch is still connected to the pulmonary trunk by the ligamentum arteriosum (remnant of the foetal ductus arteriosus).

Branches

There are three major branches arising from the aortic arch. Proximal to distal:

Brachiocephalic trunk: The first and largest branch that ascends laterally to split into the right common carotid and right subclavian arteries. These arteries supply the right side of the head and neck, and the right upper limb.

Left common carotid artery: Supplies the left side of the head and neck.

Left subclavian artery: Supplies the left upper limb.

The thoracic (descending) aorta spans from the level of T4 to T12. Continuing from the aortic arch, it initially begins to the left of the vertebral column but approaches the midline as it descends. It leaves the thorax via the aortic hiatus in the diaphragm, and becomes the abdominal aorta.

Branches

In descending order:

Bronchial arteries: Paired visceral branches arising laterally to supply bronchial and peribronchial tissue and visceral pleura. However, most commonly, only the paired left bronchial artery arises directly from the aorta whilst the right branches off usually from the third posterior intercostal artery.

Mediastinal arteries: Small arteries that supply the lymph glands and loose areolar tissue in the posterior mediastinum.

Oesophageal arteries: Unpaired visceral branches arising anteriorly to supply the oesophagus.

Pericardial arteries: Small unpaired arteries that arise anteriorly to supply the dorsal portion of the pericardium.

Superior phrenic arteries: Paired parietal branches that supply the superior portion of the diaphragm.

Intercostal and subcostal arteries: Small paired arteries that branch off throughout the length of the posterior thoracic aorta. The 9 pairs of intercostal arteries supply the intercostal spaces, with the exception of the first and second (they are supplied by a branch from the subclavian artery). The subcostal arteries supply the flat abdominal wall muscles.

Tests

1. Through the intrauterine development the arterial duct is functioning in the fetus' vascular system, that turns into lig. Arteriosum after birth. Which structures are connected with this arterial duct?

- A. Lung trunk and a descending part of aorta
- B. Right and left atrium
- C. Aorta and inferior vena cava (IVC)
- D. Lung trunk and superior vena cava
- E. Aorta and superior vena cava

2. On the X-ray picture the patient has a tumor in the trachea, that presses the aortic arch from the back. Where (comparatively to the thoracic vertebrae) locates the aortic arch?

- A. Th III.
- B. Th IV.
- C. Th V.
- D. Th II.
- E. Th VI.

3. The patient has the atherosclerosis of the ascending part of aorta and the vessels, that go from the sinus aortae. Which of the vessels are ?

- A. Coronary arteries
- B. Right subclavian artery
- C. Left subclavian artery
- D. Brachiocephalic trunk
- E. Right common carotid artery

4. The child has aortic coarctation in the place where aortic arch goes into its' descending part (thoracic aorta). Clinically identified: carotid arteries' pulsing, hypertonia of the upper half of body and the hypotonia of the lower part. Where (comparatively to the thoracic vertebrae) locates the aortic narrowing?

- A. Th I.
- B. Th II-III.
- C. Th IV.
- D. Th V.
- E. Th VI.

5. The patient, 50 y. o. was diagnosed with pericarditis. He needs a puncture to prevent an irritation of the most sensitive reflexogenic zones of the pericardium. A puncture will be done near the apex of the xiphoid process. Which arteries supply the pericardium with blood?

- A. A. thoracica interna, aorta thoracica.
- B. Aorta thoracica, truncus costocervicalis.
- C. Aorta thoracica, a. epigastrica superior.
- D. Aorta thoracica, aorta abdominalis.
- E. A. thoracica interna, aorta abdominalis.

6. The 60 y.o. patient was diagnosed with an aortic aneurism. During the operation from the lower third of the rear mediastinum's cellulose the lymphatic nodes with the metastasis were removed. Which organs, vessels and nerves had the surgeon found?

- A. Esophagus, vagus nerves, thoracic aorta, thoracic duct, sympathetic trunk, unpaired and a half-unpaired veins, large and small splanchnic nerves, inferior vena cava
- B. Superior vena cava, esophagus, vagus nerves, thoracic aorta, thoracic duct
- C. Diaphragmatic nerves, esophagus, vagus nerves, thoracic aorta, thoracic duct, large and small splanchnic nerves, retrosternal gland
- D. Heart, vagus nerves, unpaired and half-unpaired veins, thoracic aorta, thoracic duct
- E. Retrosternal gland, vagus nerves, esophagus, thoracic duct, thoracic aorta, large and small splanchnic nerves

7.7. During the heart auscultation of the patient with atherosclerosis, the systolic noise with the hands up in the second intercostal space by the right adjunctive line. Doctor identified the pathology of the aortic valve. Where does aorta start?

- A. From the left ventricle
- B. From the right ventricle
- C. From the left atrium
- D. From the right atrium
- E. From the sinus coronarius

8. The patient was diagnosed with the tumor in the lower part of esophagus, that presses the thoracic aorta. How the esophagus placed comparatively to aorta before the enter to the hiatus oesophagus diaphragmatis ?

- A. In front and right from aorta
- B. In front and left from aorta
- C. Behind and left from aorta
- D. Behind and right from aorta
- E. On the right from aorta

9. The patient was diagnosed with the tumor in the left lung. During the operation doctor secures the lung root. Which of the thoracic aorta's branches are in the lung root ?

- A. Bronchial
- B. Medialis
- C. Mediastinal
- D. Upper diaphragmatic
- E. Esophageal

10. 10. The 36 y.o. patient has the foreign body in the esophagus, that is on the level, where aorta goes through diaphragm. Where (according to the vertebrae) did the foreign body stop?

- A. Th IX-X.
- B. Th III.
- C. Th IV.
- D. Th V.
- E. Th VI.

Codes of the correct answers for the theme "Parts of aorta. Thoracic aorta"

- 1- A
- 2- B
- 3- A
- 4- C
- 5- A
- 6- C
- 7- A
- 8- B
- 9- A
- 10-A