MEDICAL EDUCATION RESOURCE

FAQs,MCQs and Viva Voce

Frequently Asked Questions (FAQs)

1. What is the extent and formation of the Superior Vena Cava (SVC)?

- Formed by the **union of right and left brachiocephalic veins** behind the lower border of the **1st right costal cartilage**.
- Extends vertically downward for about **7 cm** to open into the **right atrium** behind the **3rd right costal cartilage**.

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2. What are the main tributaries of the SVC?

- **Azygos vein** (arches over the right lung root to join the SVC).
- **Pericardial and mediastinal veins** (small, variable tributaries).

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3. What is the clinical significance of the SVC?

- **SVC obstruction** causes venous congestion in the **head, neck, and upper limbs**, producing **engorged veins** on the upper chest.
- If the block is above the azygos vein ? veins dilated on the **chest only**.
- If below the azygos vein ? veins dilated on **chest and abdomen**.

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4. What are the parts of the aorta?

1. **Ascending aorta** – within pericardium.
2. **Arch of aorta** – in superior mediastinum.
3. **Descending thoracic aorta** – in posterior mediastinum.

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5. What are the branches of the ascending aorta?

- **Right coronary artery**
- **Left coronary artery**

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6. Name the branches of the arch of the aorta.

- **Brachiocephalic trunk**
- **Left common carotid artery**
- **Left subclavian artery**
  (Mnemonic: ABCS – Arch, Brachiocephalic, Carotid, Subclavian)

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7. What are the branches of the descending thoracic aorta?

Visceral branches:

- Bronchial, esophageal, pericardial.

Parietal branches:

- Posterior intercostal, subcostal, superior phrenic arteries.

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8. What is the course of the arch of aorta?

- Begins behind **2nd right sternocostal joint**, arches **upward, backward, and to the left** over the root of the left lung, and ends at **T4 vertebral level** as the **descending aorta**.

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9. What are the important relations of the arch of aorta?

- **Anterior:** Left phrenic nerve, vagus nerve, left lung and pleura.
- **Posterior:** Trachea, esophagus, thoracic duct, left recurrent laryngeal nerve.
- **Inferior:** Bifurcation of pulmonary trunk, left bronchus, ligamentum arteriosum.
- **Superior:** Left brachiocephalic vein and branches of the arch.

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10. What is the ligamentum arteriosum?

- A **fibrous remnant** of the **ductus arteriosus**, connecting the **left pulmonary artery** to the **aortic arch** (just distal to left subclavian artery).
- Lies near the **left recurrent laryngeal nerve**.

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11. What is the developmental origin of the pulmonary trunk and aorta?

- Both develop from the **truncus arteriosus**, which divides by a **spiral septum** into the **ascending aorta** and **pulmonary trunk**.

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12. What is the embryological origin of the arch of aorta?

- Derived from the **left fourth aortic arch**, **aortic sac**, and **left dorsal aorta**.

13. What is the embryological origin of the superior vena cava?

- Upper half ? **Right anterior cardinal vein**.
- Lower half ? **Right common cardinal vein**.

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14. What is the function of the pulmonary trunk?

- Carries **deoxygenated blood** from the **right ventricle** to both lungs for oxygenation.
- Divides into **right and left pulmonary arteries** under the aortic arch.

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15. What are the relations of the pulmonary trunk?

- **Anterior:** Sternum, left pleura, and left lung.
- **Posterior:** Ascending aorta, left atrium.
- **Right:** Ascending aorta.
- **Left:** Left auricle.

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16. What is the triple relationship between pulmonary trunk and aorta?

1. At the base ? pulmonary trunk **anterior** to aorta.
2. At the upper border of heart ? pulmonary trunk **to the left** of aorta.
3. Above ? **right pulmonary artery** passes **posterior** to ascending aorta.

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17. What is the site of aortic knuckle in chest X-ray?

- Seen as a prominent bulge on the **left upper mediastinal border**, formed by the **arch of aorta**.

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18. What is the cause of rib notching in coarctation of aorta?

- Enlargement of **posterior intercostal arteries** due to collateral flow between **subclavian** and **descending aorta**.

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19. What is the “machinery murmur” and where is it heard?

- Continuous murmur due to **patent ductus arteriosus (PDA)**, heard at the **2nd left intercostal space near sternum**.

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20. Why is the left recurrent laryngeal nerve more vulnerable to injury than the right?

- The **left nerve hooks around the ligamentum arteriosum** under the aortic arch in the thorax, where aneurysms or ductus lesions can compress it.
- The **right nerve** hooks around the right subclavian artery in the neck, hence less likely affected.

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21. What are the branches of the descending thoracic aorta supplying the lungs?

- **Bronchial arteries** — one on right, two on left — supply bronchi, peribronchial tissue, and visceral pleura.

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22. What is the commonest site of aortic rupture in trauma?

- Just distal to the **ligamentum arteriosum**, where the arch becomes the descending aorta (a fixed point during deceleration injuries).

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23. What is the aortic impression on the left lung?

- A vertical groove caused by the **arch and descending aorta**, seen on the **mediastinal surface** of the left lung.

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24. How is the left bronchus related to the arch and descending aorta?

- The **arch of aorta passes over** the **left bronchus**, while the **descending aorta** lies **behind** it.

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25. Why is the SVC devoid of valves?

- Because it is a **short, large-caliber vein** draining directly into the **right atrium** where pressure fluctuations synchronize with atrial contractions.

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26. What is the significance of ligamentum arteriosum in trauma?

- During **sudden deceleration injuries (e.g., car accidents)**, the fixed aorta at this ligament tears, leading to **traumatic aortic rupture**.

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27. What is the clinical importance of the azygos vein?

- Provides a **collateral pathway** between **SVC and IVC**, maintaining venous return in cases of **SVC obstruction**.

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28. What is the difference between SVC and IVC?

FEATURE	SUPERIOR VENA CAVA	INFERIOR VENA CAVA
Drains	Upper body	Lower body
Valves	Absent	Absent
Length	7 cm	20–22 cm
Embryological Origin	Right anterior & common cardinal veins	Right vitelline vein

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29. What causes mediastinal syndrome?

- Compression of mediastinal structures by **aneurysm or tumor**, leading to:
  - **Dyspnea** (tracheal compression)
  - **Dysphagia** (esophageal compression)
  - **Hoarseness** (recurrent laryngeal nerve compression)
  - **Venous congestion** (SVC compression)

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30. What is the function of ductus arteriosus in fetal life?

- Shunts blood from **pulmonary artery to aorta**, bypassing lungs; closes after birth to form **ligamentum arteriosum**.

Multiple Choice Questions (MCQs) — Superior Vena Cava, Aorta, and Pulmonary Trunk

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1. The superior vena cava (SVC) is formed by the union of:

A. Right and left internal jugular veins
B. Right and left subclavian veins
C. Right and left brachiocephalic veins
D. Right subclavian and right internal jugular veins
? **Answer: C. Right and left brachiocephalic veins**

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2. The SVC opens into the right atrium behind which costal cartilage?

A. 1st right
B. 2nd right
C. 3rd right
D. 4th right
? **Answer: C. 3rd right**

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3. The length of the superior vena cava is approximately:

A. 3 cm
B. 5 cm
C. 7 cm
D. 10 cm
? **Answer: C. 7 cm**

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4. Which of the following veins drains directly into the superior vena cava?

A. Hemiazygos vein
B. Left superior intercostal vein
C. Azygos vein
D. Inferior vena cava
? **Answer: C. Azygos vein**

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5. The superior vena cava has how many valves?

A. One
B. Two
C. Three
D. None
? **Answer: D. None**

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6. The main tributary of the SVC is:

A. Left brachiocephalic vein
B. Azygos vein
C. Right subclavian vein
D. Internal jugular vein
? **Answer: B. Azygos vein**

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7. The obstruction of SVC below the entry of the azygos vein causes:

A. Veins dilated only on chest
B. Veins dilated on chest and abdomen
C. Engorgement in lower limbs
D. No change in venous return
? **Answer: B. Veins dilated on chest and abdomen**

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8. The arch of the aorta begins behind the:

A. Upper border of the 2nd right sternocostal joint
B. Upper border of the 1st right costal cartilage
C. Lower border of the 2nd left costal cartilage
D. Upper border of the 3rd right sternocostal joint
? **Answer: A. Upper border of the 2nd right sternocostal joint**

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9. The arch of the aorta ends at the level of:

A. T2 vertebra
B. T3 vertebra
C. T4 vertebra

D. T5 vertebra

? **Answer: C. T4 vertebra**

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10. The descending thoracic aorta begins at the level of:

A. T2 vertebra

B. T4 vertebra

C. T6 vertebra

D. T8 vertebra

? **Answer: B. T4 vertebra**

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11. The descending thoracic aorta ends at:

A. T8 vertebra

B. T10 vertebra

C. T12 vertebra

D. L1 vertebra

? **Answer: C. T12 vertebra**

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12. The aorta passes through the diaphragm at which level?

A. T8

B. T10

C. T12

D. L1

? **Answer: C. T12**

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13. The branches of the arch of the aorta are remembered by the mnemonic:

A. CAB

B. ABCS

C. BAC

D. CAS

? **Answer: B. ABCS (Arch, Brachiocephalic, Carotid, Subclavian)**

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14. The right subclavian artery is derived from which embryonic structure?

A. Left 4th aortic arch
B. Right 3rd aortic arch
C. Right 4th aortic arch and 7th intersegmental artery
D. Dorsal aorta
? **Answer: C. Right 4th aortic arch and 7th intersegmental artery**

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15. The left subclavian artery arises from:

A. Right 7th intersegmental artery
B. Left 7th intersegmental artery
C. Left 6th aortic arch
D. Left 4th aortic arch
? **Answer: B. Left 7th intersegmental artery**

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16. The arch of aorta develops from:

A. Right 4th aortic arch
B. Left 4th aortic arch
C. Right 6th aortic arch
D. Left 6th aortic arch
? **Answer: B. Left 4th aortic arch**

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17. The ligamentum arteriosum connects:

A. Left pulmonary artery and arch of aorta
B. Right pulmonary artery and SVC
C. Left bronchus and arch of aorta
D. Pulmonary trunk and right atrium
? **Answer: A. Left pulmonary artery and arch of aorta**

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18. The ligamentum arteriosum is a remnant of:

A. Ductus venosus
B. Ductus arteriosus
C. Umbilical vein
D. Umbilical artery
? **Answer: B. Ductus arteriosus**

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19. The ductus arteriosus connects:

A. Aorta and left atrium
B. Pulmonary trunk and aorta
C. Aorta and SVC
D. Aorta and coronary sinus
? **Answer: B. Pulmonary trunk and aorta**

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20. The pulmonary trunk arises from:

A. Left ventricle
B. Right ventricle
C. Left atrium
D. Right atrium
? **Answer: B. Right ventricle**

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21. The pulmonary trunk divides into:

A. Two pulmonary veins
B. Right and left pulmonary arteries
C. Right and left pulmonary veins
D. Anterior and posterior branches
? **Answer: B. Right and left pulmonary arteries**

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22. The right pulmonary artery passes:

A. In front of ascending aorta
B. Behind ascending aorta and SVC
C. Behind esophagus

D. Below left bronchus

? **Answer: B. Behind ascending aorta and SVC**

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23. The left pulmonary artery is connected to the aortic arch by:

A. Ligamentum venosum

B. Ligamentum arteriosum

C. Fossa ovalis

D. Coronary sinus

? **Answer: B. Ligamentum arteriosum**

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24. The SVC develops from:

A. Right vitelline vein

B. Right anterior and common cardinal veins

C. Left anterior cardinal vein

D. Sinus venosus

? **Answer: B. Right anterior and common cardinal veins**

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25. The pulmonary trunk and ascending aorta develop from:

A. Bulbus cordis

B. Truncus arteriosus

C. Sinus venosus

D. Primitive ventricle

? **Answer: B. Truncus arteriosus**

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26. The arch of aorta passes over:

A. Right bronchus

B. Left bronchus

C. Esophagus

D. Right pulmonary artery

? **Answer: B. Left bronchus**

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27. The descending thoracic aorta lies:

A. Anterior to the trachea
B. Posterior to the esophagus
C. Left of vertebral column
D. Right of thoracic duct
? **Answer: C. Left of vertebral column**

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28. The most common site for traumatic rupture of aorta is:

A. Ascending aorta
B. Arch of aorta
C. Just distal to ligamentum arteriosum
D. At aortic hiatus
? **Answer: C. Just distal to ligamentum arteriosum**

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29. The nerve related to the ligamentum arteriosum is:

A. Right phrenic nerve
B. Left vagus nerve
C. Left recurrent laryngeal nerve
D. Right recurrent laryngeal nerve
? **Answer: C. Left recurrent laryngeal nerve**

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30. The posterior intercostal arteries arise from:

A. Internal thoracic artery
B. Descending thoracic aorta
C. Subclavian artery
D. Axillary artery
? **Answer: B. Descending thoracic aorta**

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31. Which of the following arteries supplies the bronchial wall?

A. Pulmonary arteries
B. Bronchial arteries
C. Intercostal arteries
D. Subclavian arteries
? **Answer: B. Bronchial arteries**

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32. Rib notching on X-ray is seen in:

A. Aortic aneurysm
B. Coarctation of aorta
C. Patent ductus arteriosus
D. Tetralogy of Fallot
? **Answer: B. Coarctation of aorta**

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33. The ‘aortic knuckle’ on chest X-ray represents:

A. Ascending aorta
B. Arch of aorta
C. Descending aorta
D. Pulmonary trunk
? **Answer: B. Arch of aorta**

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34. The longest artery in the body is:

A. Femoral artery
B. Subclavian artery
C. Aorta
D. Pulmonary artery
? **Answer: C. Aorta**

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35. The pulmonary trunk carries:

A. Oxygenated blood to lungs
B. Deoxygenated blood to lungs
C. Mixed blood to lungs

D. Deoxygenated blood to heart

? **Answer: B. Deoxygenated blood to lungs**

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36. The left recurrent laryngeal nerve hooks around:

A. Right subclavian artery

B. Left subclavian artery

C. Ligamentum arteriosum

D. Pulmonary vein

? **Answer: C. Ligamentum arteriosum**

---

37. The right recurrent laryngeal nerve hooks around:

A. Left subclavian artery

B. Right subclavian artery

C. Aortic arch

D. Pulmonary trunk

? **Answer: B. Right subclavian artery**

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38. The pulmonary veins carry:

A. Deoxygenated blood

B. Oxygenated blood

C. Mixed blood

D. Nutrient blood

? **Answer: B. Oxygenated blood**

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39. The SVC obstruction causes venous blood flow to become:

A. Upward

B. Downward

C. Circular

D. None

? **Answer: B. Downward**

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40. The aortic aneurysm may compress which nerve causing hoarseness?

A. Phrenic nerve
B. Left recurrent laryngeal nerve
C. Right vagus nerve
D. Sympathetic trunk
? **Answer: B. Left recurrent laryngeal nerve**

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41. The azygos vein drains blood from:

A. Left side of thoracic wall
B. Right side of thoracic wall
C. Both sides
D. Mediastinal veins only
? **Answer: B. Right side of thoracic wall**

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42. The hemiazygos vein drains into:

A. Right atrium
B. Inferior vena cava
C. Azygos vein
D. Pulmonary vein
? **Answer: C. Azygos vein**

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43. The pulmonary arteries are branches of:

A. Pulmonary veins
B. Pulmonary trunk
C. Right atrium
D. Aortic arch
? **Answer: B. Pulmonary trunk**

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44. Which of the following vessels does not carry oxygenated blood?

A. Pulmonary vein
B. Aorta
C. Coronary artery
D. Pulmonary artery
? **Answer: D. Pulmonary artery**

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45. The descending thoracic aorta gives rise to how many pairs of posterior intercostal arteries?

A. 7
B. 9
C. 11
D. 12
? **Answer: B. 9 (from 3rd to 11th)**

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46. The left superior intercostal vein drains into:

A. Azygos vein
B. Left brachiocephalic vein
C. Hemiazygos vein
D. Internal thoracic vein
? **Answer: B. Left brachiocephalic vein**

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47. The right superior intercostal vein drains into:

A. Azygos vein
B. Right brachiocephalic vein
C. SVC
D. Internal thoracic vein
? **Answer: A. Azygos vein**

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48. The artery supplying the pericardium is derived from:

A. Subclavian artery
B. Internal thoracic artery

C. Aortic arch
D. Descending thoracic aorta
? **Answer: D. Descending thoracic aorta**

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49. The bronchial arteries supplying the lungs arise from:

A. Ascending aorta
B. Arch of aorta
C. Descending thoracic aorta
D. Internal thoracic artery
? **Answer: C. Descending thoracic aorta**

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50. The thoracic duct lies in relation to the descending aorta:

A. Right side
B. Left side
C. Posterior
D. Anterior
? **Answer: A. Right side (inferiorly) and crosses to left superiorly)**

Viva Voce — Superior Vena Cava, Aorta, and Pulmonary Trunk

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1. What is the superior vena cava (SVC)?

The **SVC** is a large systemic vein that drains **deoxygenated blood from the upper half of the body** (head, neck, upper limbs, and thoracic wall) into the **right atrium**.

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2. How is the SVC formed?

By the **union of right and left brachiocephalic veins** behind the lower border of the **first right costal cartilage** near the sternum.

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3. Where does the SVC terminate?

It opens into the **upper posterior part of the right atrium** behind the **third right costal cartilage**.

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4. What is the length of the SVC?

Approximately **7 cm** long — upper half **extrapericardial**, lower half **intrapericardial**.

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5. What are the tributaries of the SVC?

- **Azygos vein** (main tributary)
- **Small mediastinal and pericardial veins**

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6. Does the SVC contain any valve?

No, the SVC is **valveless**.

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7. What are the relations of the SVC?

- **Anterior:** Right pleura and lung, internal thoracic artery, sternum.
- **Posterior:** Trachea, right vagus nerve, right pulmonary artery.
- **Medial:** Ascending aorta.
- **Lateral:** Right phrenic nerve and pleura.

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8. What are the developmental sources of the SVC?

- **Upper half:** Caudal part of the **right anterior cardinal vein**.
- **Lower half: Right common cardinal vein**.

9. What is the clinical importance of the SVC?

- **SVC obstruction** produces **facial puffiness**, **dilated neck and chest veins**, and **engorgement** of superficial veins.
- **Above azygos entry:** Veins dilated on **chest only**.
- **Below azygos entry:** Veins dilated on **chest and abdomen**.

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10. What is the azygos vein and what is its importance?

The **azygos vein** drains the **posterior thoracic wall** and acts as a **collateral channel** between the **SVC and IVC** in case of obstruction.

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11. What is the aorta?

The **aorta** is the **main arterial trunk** of systemic circulation carrying **oxygenated blood from the left ventricle** to all parts of the body.

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12. What are the parts of the aorta?

1. **Ascending aorta**
2. **Arch of aorta**
3. **Descending thoracic aorta** (which continues as **abdominal aorta**).

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13. What are the branches of the ascending aorta?

- **Right coronary artery**

- **Left coronary artery**

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14. What are the branches of the arch of aorta?

1. **Brachiocephalic trunk**
2. **Left common carotid artery**
3. **Left subclavian artery**
   (Mnemonic: ABCS – Arch, Brachiocephalic, Carotid, Subclavian)

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15. What are the branches of the descending thoracic aorta?

- **Visceral branches:** Bronchial, esophageal, pericardial arteries.
- **Parietal branches:** Posterior intercostal, subcostal, and superior phrenic arteries.

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16. Where does the arch of aorta begin and end?

- **Begins:** Behind the **upper border of 2nd right sternocostal joint**.
- **Ends:** At the level of **T4 vertebra**, continuing as descending thoracic aorta.

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17. What are the important relations of the arch of aorta?

- **Anterior:** Left phrenic and vagus nerves, left lung and pleura.
- **Posterior:** Trachea, esophagus, thoracic duct, left recurrent laryngeal nerve.
- **Inferior:** Pulmonary trunk, ligamentum arteriosum, left bronchus.

18. What is the ligamentum arteriosum?

It is a **fibrous remnant** of the **ductus arteriosus**, connecting the **left pulmonary artery** to the **arch of aorta**.

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19. What is the embryological origin of the aortic arch?

Derived from the **left fourth aortic arch**, **aortic sac**, and **left dorsal aorta**.

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20. What is the “aortic knuckle” seen in chest X-ray?

It is the **lateral bulge** of the **arch of aorta** seen on the **left upper mediastinal border**.

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21. What is the course of the descending thoracic aorta?

Runs **downward and backward** on the **left side of the vertebral column** from **T4 to T12**, then passes through the **aortic hiatus** to become the **abdominal aorta**.

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22. At what level does the aorta pass through the diaphragm?

At the level of **T12 vertebra** (aortic opening).

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23. What are the visceral branches of the descending thoracic aorta?

- **Bronchial arteries** (one right, two left)
- **Esophageal arteries**
- **Pericardial branches**

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24. What are the parietal branches of the descending thoracic aorta?

- **Posterior intercostal arteries** (3rd–11th spaces)
- **Subcostal arteries**
- **Superior phrenic arteries**

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25. What are the relations of the descending thoracic aorta?

- **Anterior:** Root of left lung, pericardium, esophagus.
- **Posterior:** Vertebral column, hemiazygos veins.
- **Right side:** Esophagus, thoracic duct, azygos vein.
- **Left side:** Left lung and pleura.

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26. What is the pulmonary trunk?

A large arterial trunk carrying **deoxygenated blood from the right ventricle** to the **lungs** via **right and left pulmonary arteries**.

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27. What is the course and termination of the pulmonary trunk?

- Arises from **right ventricle**, ascends obliquely **upward, backward, and left**,
- Divides beneath the **aortic arch** into **right and left pulmonary arteries**.

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28. What are the relations of the pulmonary trunk?

- **Anterior:** Sternum, left pleura, left lung.

- **Posterior:** Ascending aorta, left atrium.
- **Right:** Ascending aorta.
- **Left:** Left auricle.

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29. What is the triple relationship between the pulmonary trunk and aorta?

1. At the base of the heart — **pulmonary trunk anterior to aorta**.
2. At the upper border of heart — **pulmonary trunk left of aorta**.
3. Above this — **right pulmonary artery posterior to ascending aorta**.

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30. What is the function of the ductus arteriosus in fetal life?

Shunts blood from **pulmonary trunk** to **aortic arch**, bypassing nonfunctional lungs.

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31. What does the ductus arteriosus become after birth?

It becomes the **ligamentum arteriosum**.

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32. What is the developmental origin of the pulmonary trunk?

Develops from the **truncus arteriosus** (common outflow tract of primitive heart tube).

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33. What is the developmental origin of the right and left pulmonary arteries?

- **Proximal parts:** From **6th aortic arches**.
- **Distal part:** From **left 6th aortic arch** ? forms **ductus arteriosus**.

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34. What happens if the ductus arteriosus fails to close?

Results in **Patent Ductus Arteriosus (PDA)** causing a **continuous machinery murmur** and **left-to-right shunt**.

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35. What is the cause of hoarseness in an aortic arch aneurysm?

Compression of the **left recurrent laryngeal nerve**, which loops under the **arch of aorta** near the **ligamentum arteriosum**.

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36. What is coarctation of the aorta?

Congenital **narrowing of the aortic arch**, usually just distal to the **ductus arteriosus** ? causes **collateral circulation via intercostal arteries** (rib notching).

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37. What is the “rib notching” sign and why does it occur?

Indentation of inferior margins of ribs due to **enlarged intercostal arteries** forming collateral pathways in **coarctation of the aorta**.

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38. What is aortic dissection?

A tear in the **intima** of the aorta allowing blood to enter the **media**, forming a **false channel** — may rupture into the pericardial cavity (tamponade).

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39. What is the most common site for traumatic rupture of the aorta?

Just distal to the **ligamentum arteriosum**, where the aorta is fixed and prone to shearing stress.

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40. What are the differences between SVC and IVC?

FEATURE	SUPERIOR VENA CAVA	INFERIOR VENA CAVA
Length	~7 cm	~20 cm
Valves	Absent	Absent
Drains	Upper half of body	Lower half of body
Embryological Source	Right anterior & common cardinal veins	Right vitelline vein

---

41. What is the left superior intercostal vein and where does it drain?

It drains the **2nd and 3rd left intercostal spaces** and opens into the **left brachiocephalic vein**.

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42. What is the right superior intercostal vein and where does it drain?

It drains the **2nd and 3rd right intercostal spaces** and opens into the **azygos vein**.

---

43. What is the significance of the ligamentum arteriosum in trauma?

It is a **fixed point** of the aorta; sudden deceleration injuries can tear the aorta just distal to this point ? **fatal hemorrhage**.

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44. What is the function of the bronchial arteries?

They supply **oxygenated blood to the lung tissue** (bronchi, connective tissue, and visceral pleura).

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45. What is the function of the pulmonary arteries?

They carry **deoxygenated blood** from the **right ventricle** to the **lungs** for oxygenation.

46. What is the difference between pulmonary and bronchial circulation?

- **Pulmonary circulation:** Gas exchange; carries deoxygenated blood.
- **Bronchial circulation:** Nutritional supply; carries oxygenated blood.

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47. What nerve lies closest to the ligamentum arteriosum?

The **left recurrent laryngeal nerve**.

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48. What structures lie in front of the arch of aorta?

Left vagus nerve, left phrenic nerve, left lung, and pleura.

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49. What structures lie behind the arch of aorta?

Trachea, esophagus, thoracic duct, left recurrent laryngeal nerve.

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50. Why is the SVC called “valveless”?

It lacks valves to allow free drainage of blood into the right atrium, accommodating intrathoracic pressure variations.