MEDICAL EDUCATION RESOURCE

# Mnemonics and Clinicoanatomical Problem

## Mnemonics

### 1. Venous Relations in the Thoracic Cage

To recall the position of major venous structures in relation to the sternum and costal cartilages:

- **Behind sternoclavicular joints** ? *Brachiocephalic veins begin*
- **Behind 1st right costal cartilage** ? *Superior vena cava begins*
- **Behind 2nd right costal cartilage** ? *Azygos vein ends*
- **Behind 3rd right costal cartilage** ? *Superior vena cava ends*

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### 2. Branches of Arch of Aorta — “Know your ABC’S”

- **A** – *Arch of aorta*
- **B** – *Brachiocephalic trunk*
- **C** – *Left Common Carotid artery*
- **S** – *Left Subclavian artery*

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### 3. Lung Lobes and Heart Valves — “Right is Tri, Left is Bi”

- **Right side:** *Tricuspid valve* and *Tri-lobed lung*
- **Left side:** *Bicuspid (Mitral) valve* and *Bi-lobed lung*

**Clinicoanatomical Problem**

A **teenage girl** presented with **breathlessness**. On **auscultation**, the physician detected a **machine-like murmur** and a **continuous thrill** at the **second left intercostal space** near the **sternal margin**.
Chest radiographs and **angiocardiography** confirmed the diagnosis of **Patent Ductus Arteriosus (PDA)**

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**Questions & Answers**

**1. What is the 'machine-like' murmur?**
It is the **continuous murmur** produced by **shunting of blood** from the **aorta** (higher pressure) into the **pulmonary artery** (lower pressure) through a **patent ductus arteriosus**.

**2. How can the shunting of blood be prevented?**
By **surgical ligation** or **catheter-based closure** of the ductus arteriosus to stop the abnormal communication between the **aorta** and **pulmonary artery**.

**3. What is the function of ductus arteriosus in prenatal life? When does it close?**

- During fetal life, the **ductus arteriosus** diverts **right ventricular blood** from the **pulmonary artery** directly into the **aorta**, bypassing the non-functional lungs.
- It connects the **left pulmonary artery** to the **arch of aorta**, distal to the left subclavian artery.

- Normally it **closes shortly after birth** due to increased oxygen tension and decreased prostaglandin levels, becoming the **ligamentum arteriosum**.

- If it remains patent (about 1 in 3000 births), **backflow from aorta to pulmonary artery** produces a **continuous murmur**.

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**Clinical Insight**

Persistent PDA leads to **left-to-right shunt**, **pulmonary hypertension**, **right ventricular hypertrophy**, and eventually **heart failure** if untreated

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**1. Superior Vena Cava (SVC) Obstruction**

**Case:**
A 45-year-old man presents with **facial puffiness**, **prominent neck veins**, and **superficial chest wall veins** visible up to the costal margin. He complains of **difficulty in breathing when bending forward**.

**Explanation:**
These are signs of **SVC obstruction**, commonly caused by **bronchogenic carcinoma** or **mediastinal lymphadenopathy** compressing the SVC.

**Anatomical Correlation:**

- If obstruction is **above** the entry of the **azygos vein**, venous blood drains via the **azygos system** ? veins dilated only on **chest**.

- If obstruction is **below** the azygos entry, blood drains through **thoracoepigastric veins** to the **IVC** ? veins dilated on **chest and abdomen**.

**Clinical Note:**
Engorgement of veins in **upper body** with **downward blood flow** direction is diagnostic.

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### 2. Coarctation of the Aorta

**Case:**
A 16-year-old boy presents with **headache**, **weak femoral pulses**, and **radio-femoral delay**. X-ray shows **rib notching** due to enlarged intercostal arteries.

**Explanation:**
Coarctation = **congenital narrowing of the aorta** just distal to the **ductus arteriosus** (near the **ligamentum arteriosum**).

**Anatomical Correlation:**

- Blood flow bypasses the constriction via **collaterals**:
  Subclavian ? Internal thoracic ? Anterior intercostal ? Posterior intercostal ? Descending aorta.

- The enlarged intercostal arteries **erode ribs**, producing **notching** on X-ray.

**Clinical Note:**
Upper limb BP is **higher** than lower limb BP; treated surgically.

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### 3. Aortic Aneurysm

**Case:**
A 55-year-old man complains of **hoarseness of voice**, **dysphagia**, and **dyspnea**. Radiograph shows **widened superior mediastinum** and **aortic knuckle** prominence.

**Explanation:**
Due to **aneurysmal dilation of the arch of aorta** compressing adjacent structures.

**Anatomical Correlation:**

- **Left recurrent laryngeal nerve** (around ligamentum arteriosum) ? **hoarseness**.

- **Trachea and esophagus** ? **dyspnea and dysphagia**.

- **Left bronchus and phrenic nerve** may also be affected.

**Clinical Note:**
This constellation of findings = **Mediastinal Syndrome**.

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**4. Patent Foramen Ovale with Aortic Enlargement**

**Case:**
A 20-year-old athlete experiences **breathlessness** and **palpitations**. Echocardiography reveals **mild right atrial dilation** and **left-to-right shunt** through a **patent foramen ovale**.

**Explanation:**
Failure of fusion between **septum primum** and **septum secundum**.
Increased pressure in left atrium due to **aortic hypertension** causes **left-to-right shunt**, increasing pulmonary flow.

**Clinical Note:**
Prolonged condition can lead to **Eisenmenger's syndrome** (reversal of shunt).

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**5. Pulmonary Artery Hypertension**

**Case:**
A 30-year-old woman with **long-standing mitral stenosis** develops **progressive dyspnea** and **right-sided heart failure**.

**Explanation:**
Mitral stenosis increases left atrial pressure ? **back pressure** transmitted to **pulmonary veins** ? **pulmonary trunk dilation**.

**Anatomical Correlation:**
The **pulmonary trunk**, normally anterior and left to the aorta, enlarges and may compress the **left recurrent laryngeal nerve**, leading to **hoarseness**.

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**6. Persistent Left Superior Vena Cava**

**Case:**
A 25-year-old undergoing cardiac catheterization is found to have the catheter entering the **coronary sinus** instead of the right atrium.

**Explanation:**
Due to persistence of the **left anterior cardinal vein**, forming a **left SVC** draining into the **coronary sinus**.

**Clinical Note:**
Usually asymptomatic but important during central venous access or pacemaker placement.

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### 7. Aortic Dissection

**Case:**
A 58-year-old hypertensive patient presents with **sudden severe chest pain radiating to the back**.

**Explanation:**
A tear in the **intima of the ascending aorta** creates a **false lumen** between tunica layers.
Blood tracks along the wall, potentially rupturing into the **pericardial cavity**, leading to **cardiac tamponade**.

**Clinical Note:**
This is a surgical emergency with high mortality.

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### 8. Ligamentum Arteriosum and Trauma

**Case:**
A driver involved in a car crash develops **massive hemorrhage** into the mediastinum. Autopsy reveals **rupture of aorta** just distal to **ligamentum arteriosum**.

**Explanation:**
The aorta is fixed at the ligamentum arteriosum; sudden deceleration causes **shearing stress** at this point — a **classic site of traumatic aortic rupture**.

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### 9. Azygos Vein Engorgement

**Case:**

A patient with **SVC obstruction above azygos entry** shows a **dilated arching vein** in the right paratracheal region on chest X-ray.

**Explanation:**

The **azygos vein** provides an **alternate venous route** to the heart when the upper SVC is obstructed.

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**10. Double Aortic Arch (Developmental Anomaly)**

**Case:**

A 5-year-old boy presents with **difficulty swallowing and noisy breathing** since birth.

**Explanation:**

Persistence of both **right and left dorsal aortae** forms a **vascular ring** around the trachea and esophagus, causing compression.

**Clinical Note:**

Surgical division of one arch relieves symptoms.