Dr. Weyrich

**G07: Superior and Posterior Mediastina**

**Reading:**
1. Gray's Anatomy for Students, chapter 3

**Objectives:**
1. Subdivisions of mediastinum
2. Structures in Superior mediastinum
3. Structures in Posterior mediastinum

**Clinical Correlate:**
1. Aortic aneurysms

**Superior Mediastinum**

*(pp.181-199)*

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[Diagram: Lateral view of the thorax showing the superior mediastinum with labels for Superior Mediastinum, Anterior Mediastinum, Middle Mediastinum (Heart), Transverse Thoracic Plane, T1, T3, T5, Posterior Mediastinum, and a section labeled Mediastina, Lateral view of Thorax.]
Review of the Subdivisions of the Mediastinum

Superior mediastinum
Comprises area within superior thoracic aperture and transverse thoracic plane
- Transverse thoracic plane – arbitrary line from the sternal angle anteriorly to the IV disk or T4 and T5 posteriorly

Inferior mediastinum
Extends from transverse thoracic plane to diaphragm; 3 subdivisions

Anterior mediastinum – smallest subdivision of mediastinum
- Lies between the body of sternum and transversus thoracis muscles anteriorly and the pericardium posteriorly
- Continuous with superior mediastinum at the sternal angle and limited inferiorly by the diaphragm
- Consists of sternopericardial ligaments, fat, lymphatic vessels, and branches of internal thoracic vessels.
  Contains inferior part of thymus in children

Middle mediastinum – contains heart

Posterior mediastinum

Superior Mediastinum

Thymus – lies posterior to manubrium and extends into the anterior mediastinum
- Important in development of immune system through puberty
- Replaced by adipose tissue in adult

Arterial blood supply
- Anterior intercostals and mediastinal branches of internal thoracic artery

Venous blood supply
- Veins drain into left brachiocephalic, internal thoracic, and thymic veins
**Brachiocephalic Veins** - Formed by the juncture of respective internal jugular and subclavian veins

Right brachiocephalic vein

- Receives lymph from right lymphatic duct

Left brachiocephalic vein

- Over twice as long as the right brachiocephalic vein
- Receives lymph from the thoracic duct

**Left Superior Intercostal Vein**

**Superior Vena Cava (SVC)**

Returns blood from all structures superior to diaphragm except the heart and lungs

- Drains into right atrium
- Runs in the right side of the superior mediastinum
- Right phrenic nerve lies between the SVC and mediastinal pleura
Arch of the Aorta (table 1.6, p. 145)

Ligamentum arteriosum – remnant of fetal ductus arteriosus
- Extends from root of left pulmonary artery to inferior surface of arch of aorta
- Left recurrent laryngeal hooks beneath arch of aorta, adjacent to ligamentum arteriosum

Brachiocephalic trunk – first branch of aorta
- Divides into right common carotid and right subclavian arteries

Left common carotid artery – 2nd branch of the arch
Left subclavian artery – 3rd branch of the arch

Clinical Correlate (p. 147)

Aortic arch aneurysms
Nerves (pp. 188-191)

Vagus nerves – arise from medulla of the brain, exit the cranium, and
descend through the neck posterolateral to the common carotid arteries

- Right vagus nerve – enters thorax anterior to right subclavian artery
- Right recurrent laryngeal nerve – arises from right vagus and hooks
  around the right subclavian artery and ascends to larynx
- Contributed to pulmonary, esophageal, and cardiac plexuses
- Left vagus nerve – enters mediastinum between left common
  carotid and left subclavian arteries
- Left recurrent laryngeal nerve – arises from left vagus and ascends
to larynx

Phrenic nerves – supply the diaphragm

- Right phrenic nerve
- Left phrenic nerve

Trachea

Esophagus
Posterior Mediastinum
(pp. 150-156)

Contents

Thoracic aorta

Bronchial branches – supply trachea, bronchi and lymph nodes
Pericardial branches – supply pericardium
Posterior intercostal branches
Superior phrenic branches
Esophageal branches
Subcostal branches
Esophagus

Thoracic duct - largest lymphatic channel in the body; empties into the venous system near the union of the left internal jugular and subclavian veins

Cisterna chyli – origination of thoracic duct

Azygos system of veins – drains back and thoracoabdominal walls

Azygos (i.e., paired) vein – forms collateral pathway between the SVC and IVC

- Receives the posterior intercostal, mediastinal, esophageal, and bronchial veins. Also receives vertebral venous plexuses

Hemiazygos vein – ascends on the left side of the vertebral column; crosses to the right side (~ T9 vertebra) and joins azygos vein

- Receives the inferior three posterior intercostal, inferior esophageal, and some mediastinal veins

Accessory hemiazygos vein – passes on the left side of the vertebral column through the medial end of 4th-5th intercostal space to T7-T8 where it crosses to the right side and joins the azygos vein

• NOTE – The azygos system exhibits tremendous variation from person to person
Nerves

Thoracic sympathetic trunks

Lower thoracic splanchnic nerves

- Greater (arises from sympathetic trunk at T5-T9)
  - Conveys preganglionic sympathetic fibers to the celiac ganglia

- Lesser (arises from sympathetic trunk at T10-T11)
  - Conveys preganglionic sympathetic fibers to the superior mesenteric ganglia

- Least (arises from sympathetic trunk at T12)
  - Conveys preganglionic sympathetic fibers to the aorticorenal ganglia
## Nerves of the Thorax

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Origin</th>
<th>Course</th>
<th>Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vagus (CN X)</strong></td>
<td>8 to 10 rootlets from medulla of brainstem</td>
<td>Enters superior mediastinum posterior to sternoclavicular joint and brachiocephalic vein; gives rise to recurrent laryngeal nerve; continues to abdomen</td>
<td>Pulmonary plexus; esophageal plexus; cardiac plexus</td>
</tr>
<tr>
<td><strong>Phrenic</strong></td>
<td>Ventral rami of C3-C5 nerves</td>
<td>Passes through superior thoracic aperture and runs between mediastinal pleura and pericardium</td>
<td>Central portion of the diaphragm</td>
</tr>
<tr>
<td><strong>Intercostals</strong></td>
<td>Ventral rami of T1 to T11 nerves</td>
<td>Run in intercostal spaces between internal and innermost layers of intercostal muscles</td>
<td>Muscles and skin over intercostal space; lower nerves supply muscles and skin of anterolateral abdominal wall</td>
</tr>
<tr>
<td><strong>Subcostal</strong></td>
<td>Ventral ramus of T12 nerve</td>
<td>Follows inferior border of 12th rib and passes into abdominal wall</td>
<td>Abdominal wall and skin of gluteal region</td>
</tr>
<tr>
<td><strong>Recurrent laryngeal</strong></td>
<td>Vagus nerve</td>
<td>Loops around subclavian on right; on left runs around arch or aorta and ascends in tracheoesophageal groove</td>
<td>Intrinsic muscles of larynx (except cricothyroid)</td>
</tr>
<tr>
<td><strong>Cardiac Plexus</strong></td>
<td>Cervical and cardiac branches of vagus nerve and sympathetic trunk</td>
<td>From arch of aorta and posterior surface of heart; fibers extend along coronary arteries and to SA node</td>
<td>Impulses pass to SA node</td>
</tr>
<tr>
<td><strong>Pulmonary Plexus</strong></td>
<td>Vagus nerve and sympathetic trunk</td>
<td>Forms on root of lung and extends along bronchial subdivisions</td>
<td>Bronchial subdivisions</td>
</tr>
<tr>
<td><strong>Esophageal Plexus</strong></td>
<td>Vagus nerve; sympathetic trunk; greater splanchnic nerve</td>
<td>Distal to tracheal bifurcation, the vagus and sympathetic nerves form a plexus around the esophagus</td>
<td>Vagal and sympathetic fibers to smooth muscle and glands of inferior two-thirds of esophagus</td>
</tr>
</tbody>
</table>
### Aorta and Branches in the Thorax

<table>
<thead>
<tr>
<th>Artery</th>
<th>Origin</th>
<th>Course</th>
<th>Branches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ascending aorta</td>
<td>Aortic orifice of left ventricle</td>
<td>Ascends approximately 5 cm to sternal angle where it becomes arch of aorta</td>
<td>Right and left coronary arteries</td>
</tr>
<tr>
<td>Arch of aorta</td>
<td>Continuation of ascending aorta</td>
<td>Arches posteriorly on left side of trachea and esophagus and superior to left main bronchus</td>
<td>Brachiocephalic; left common carotid; left subclavian</td>
</tr>
<tr>
<td>Thoracic aorta</td>
<td>Continuation of arch of aorta</td>
<td>Descends in posterior mediastinum to left of vertebral column; gradually shifts to right to lie in median plane at aortic hiatus</td>
<td>Posterior intercostal; bronchial; esophageal; pericardial; superior phrenic; subcostal arteries</td>
</tr>
<tr>
<td>Posterior intercostal</td>
<td>Posterior aspect of thoracic aorta</td>
<td>Pass laterally, and then anteriorly parallel to ribs</td>
<td>Lateral and anterior cutaneous branches</td>
</tr>
<tr>
<td>Bronchial</td>
<td>Anterior aspect of aorta or posterior intercostal artery</td>
<td>Run with tracheobronchial tree</td>
<td>Bronchial and peribronchial tissue; visceral pleura</td>
</tr>
<tr>
<td>Esophageal</td>
<td>Anterior aspect of thoracic aorta</td>
<td>Run anterior to esophagus</td>
<td>To esophagus</td>
</tr>
<tr>
<td>Pericardial</td>
<td>Anterior aspect of thoracic aorta</td>
<td>Send twigs to pericardium</td>
<td>To pericardium</td>
</tr>
<tr>
<td>Superior Phrenic</td>
<td>Anterior aspects of thoracic aorta</td>
<td>Arise at aortic hiatus and pass to superior aspect of diaphragm</td>
<td>To diaphragm</td>
</tr>
<tr>
<td>Subcostal</td>
<td>Posterior aspects of thoracic aorta</td>
<td>In series with posterior intercostal arteries just inferior to the 12th rib</td>
<td>Lateral and anterior cutaneous branches</td>
</tr>
</tbody>
</table>