Dr. Weyrich

G04: Anterior Thoracic Wall, Breast and Lymphatic System

Reading: 1. Gray’s Anatomy for Students, Chapter 3

Objectives: 1. Osteocartilaginous thoracic cage
2. Anatomy of the female breast
3. Muscles of the thorax
4. Blood supply and innervation of the thoracic region

Clinical Correlates: 1. Breast cancer

Bones of the Thoracic Wall
(pp. 118-126)

Skeleton of the Thoracic Wall

Thoracic vertebrae (pp. 119-120)

Costal facets
Spinous processes

Superior View, thoracic vertebrae and rib
Skeleton of the Thoracic Wall

Ribs (pp. 120-122)

True ribs (1-7) – attach directly to the sternum
False ribs (8-10) – attach to the costal cartilages of superior ribs
Floating ribs (11-12) – no attachment to the sternum

Typical rib features

- head
- neck
- body
- superior facet
- inferior facet
- tubercle
- angle
- costal groove

Atypical ribs (1, 2, 11, 12)

Costal cartilages
Skeleton of the Thoracic Wall

**Sternum** (p. 122)
- Manubrium
- Body
- Xiphoid process
- Jugular notch
- Sternal angle (2\textsuperscript{nd} rib articulates here)
- Sternal joints
  - Manubriosternal joint
  - Xiphisternal joint
Skeleton of the Thoracic Wall – Joints (pp. 123-125)

Costovertebral joints
Joints of the heads of the ribs
Costotransverse joints
Costochondral joints
Interchondral joints
Sternocostal joints

Manubrium
Costochondral Joint
Body
Sternocostal Joints
Xiphoid Process
Interchondral Joints

Manubriosternal Joint
Xiphisternal Joint
Floating Ribs

Anterior View of Thoracic Region
Breast
(pp. 115-116)

Female Breast  (pp. 115-116)

- Areola
- Nipple
- Suspensory ligaments
- Lactiferous ducts
- Mammary glands
Breast - Arterial supply

Anterior intercostal aa.
-Originate from internal thoracic a.

Lateral thoracic and thoracoacromial aa.
-Originate from axillary a.

Posterior intercostal aa.
-Originate from thoracic aorta

Breast - Venous drainage

Mainly to the axillary v.
Some drainage to the internal thoracic v.

Breast - Innervation

Intercostal nerves
The Lymphatic System (pp. 333-336)

Main Lymphatic Vessels

Cisterna chyli
- Located at approximately L1
- Drains into the thoracic duct

Thoracic Duct
- drains into the left subclavian vein

Right Lymphatic duct
- drains into the right subclavian vein
Lymphatic drainage of the breast (p. 116)

- Lateral quadrant of the breast drains mainly to the axillary lymph nodes
- Medial quadrant of the breast drains mainly to the parasternal lymph nodes

Clinical Correlate (p. 117)

Breast cancer and metastasis to lymph nodes
Muscles of the Thoracic Wall
(pp. 117-118)

Muscles of the Pectoral Region (pp. 117-118, table 3.1)

Pectoralis Major

Medial attachments
- Clavicular head – clavicle
- Sternocostal head – sternum, superior 6 costal cartilages, and aponeurosis of external oblique m.

Lateral attachments
- Intertubercular groove of humerus

Innervation
- Lateral and medial pectoral nerves

Main actions
- Adducts and medially rotates humerus
- Draws scapula anteriorly and inferiorly
Muscles of the Pectoral Region (con’t)

Pectoralis Minor

Inferior attachments
- 3rd-5th ribs

Superior attachments
- Coracoid process of scapula

Innervation
- Medial pectoral nerve

Main actions
- Stabilizes scapula

Subclavius

Inferior attachments
- 1st rib and its costal cartilage

Superior attachments
- Middle third of clavicle

Innervation
- Nerve to the subclavius

Main actions
- Anchors and depresses the clavicle
**Serratus Anterior** (pp. 645-646 and table 7.4)

Medial attachments

- Lateral parts of 1st-8th ribs

Lateral attachments

- Medial border of scapula

Innervation

- Long thoracic nerve

Main actions

- Protracts and rotates scapula
**Intercostal Muscle Group** (pp. 127-129)

**External Intercostals**
- Inferior attachments
  - Superior border of inferior ribs
- Superior attachments
  - Inferior border of superior ribs
- Innervation
  - Intercostal nerves
- Main actions
  - Elevate ribs

**Internal Intercostals**
- Inferior attachments
  - Inferior border of rib
- Superior attachments
  - Superior border of ribs
- Innervation
  - Intercostal nerves
- Main actions
  - Depress ribs

**Innermost Intercostals**
- Inferior attachments
  - Inferior border of ribs
- Superior attachments
  - Superior border of ribs
- Innervation
  - Intercostal nerves
- Main actions
  - Elevate ribs

**Clinical Correlates:**
- Thoracocentesis
- Intercostal nerve block
Subcostal
Inferior attachments
- Superior borders of lower ribs
Superior attachments
- Internal surface of lower ribs
Innervation
- Intercostal nerves
Main actions
- Elevate ribs

Transversus Thoracis
Inferior attachments
- Internal surface of costal cartilage
Superior attachments
- Posterior surface of lower sternum
Innervation
- Intercostal nerves
Main actions
- Depress ribs
**Scalene Muscles**

Medial attachments
- Transverse processes of C4-C6

Lateral attachments
- 1\textsuperscript{st} and 2\textsuperscript{nd} ribs

Innervation
- Ventral rami of cervical spinal nerves

Main actions
- Elevates first and second ribs
- Flexes neck laterally
Blood Supply and Innervation of the Thoracic Region  
(pp. 129-133)

Arterial Supply

Internal thoracic arteries.

-Originate from subclavian arteries

Anterior intercostal arteries

-Originate from internal thoracic and musculophrenic arteries

Posterior intercostal arteries

-First two intercostal aa. originate from the superior intercostal a.
  -Branch of the costocervical trunk of the subclavian artery
  -Remaining posterior intercostals originated from thoracic aorta

Subcostal artery (feeds the 12th rib)

-Originates from the thoracic aorta

Venous Supply

Internal thoracic veins

-Drain into brachiocephalic veins

Anterior intercostal veins

-Drain into internal thoracic veins

Posterior intercostal veins

-First three posterior intercostals unite to form the superior intercostal vein
  -Superior intercostals drain into the brachiocephalic veins
  -Remaining posterior intercostals usually drain into the azygos venous system
Diaphragm
(pp. 134-135)

Diaphragm

Attachments

Xiphoid process

Costal Margin

Ribs XI and XII

Ligaments

Vertebral column of the lumbar region

Arterial Supply

Superior phrenic arteries

Inferior phrenic arteries

Venous Supply

Parallels the arteries

Innervation

Phrenic nerves
Thorax (Conceptual Overview)
(pp. 102-114)

Functions (p. 103)

Breathing
Protection of vital organs
Conduit

Component Parts (pp. 102-106)

Thoracic wall
Superior thoracic aperture
Inferior thoracic aperture
Diaphragm
Mediastinum
Pleural Cavities

Relationship to Other Regions (pp. 107-108)

Neck
Upper Limb
Abdomen
Breast
Thorax (Conceptual Overview, con’t)
(pp. 102-114)

Key Features (pp. 108-114)

Vertebral level

Venous shunts from left to right

Segmental neurovascular supply of thoracic wall

Sympathetic system

Flexible wall and inferior thoracic aperture

Innervation of the diaphragm