ppt Anatomy

Axial Anatomy

Joints of the skull

1-Immobile fibrous; sag., cor. lamd.sutures

2- Immobile primary cart.; basi-sphenoid

3- Minor mobile second cart.symp menti.

4- Mobile synovial joints between the three bony osscicles of the ear.

5- The most important joint lies between head of mandible & mandibular fossa of temporal bone at temporo mandibular (TMJ) • It allows elevation, depression, protraction, retraction and side to side movements that occur by muscles of mastication •It is contains a fibro-Cart. Disc inside it

•It is encapsulated, with reinforcement by 3 ligaments: 1-Temporo-mandibular. 2-Spheno-mandibular. 3-Stylo-mandibular.

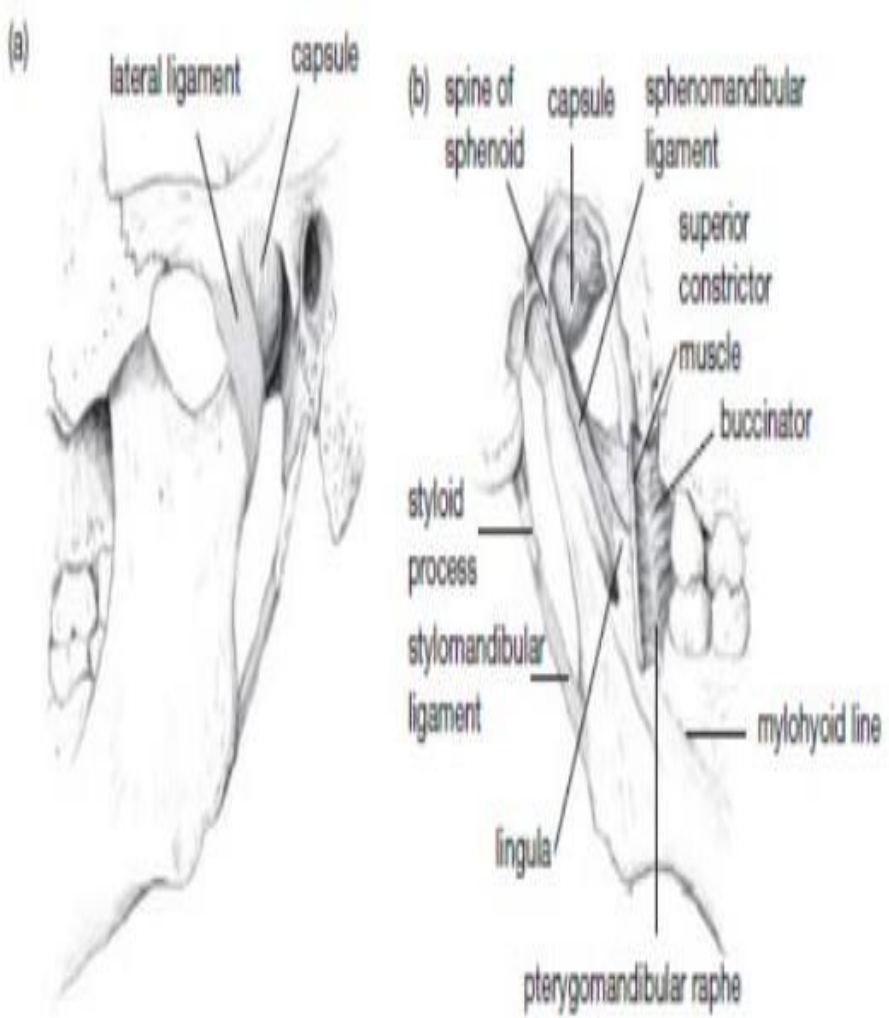


Fig. 11.8 Temporomandibular joint and its ligaments: (a) lateral aspect; (b) medial aspect.

Joints between cervical vertebra

1-Lateral masses of the C1 vertebra articulates with condyles on the occipital bone at Atlanto-Occipital Joint, which is aloosely encapsulated synovial joint that permits flexion & extension (Nodding or YES movements).

2-Lateral masses of atlas articulate with superior articular facets of the axis at Atlanto-Axial Joints permit rotation movements. (Side to Side or NO movement).

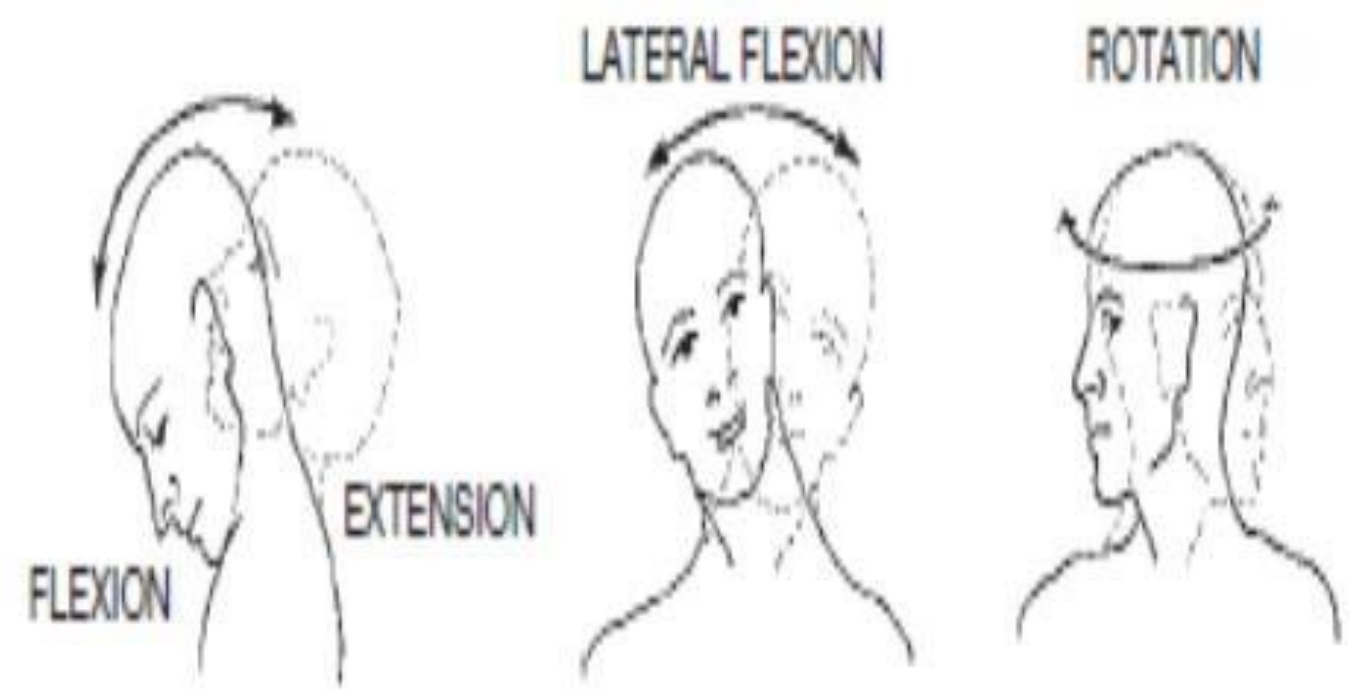


Fig. 11.20 Anatomical relations used to describe movements of the head and neck.

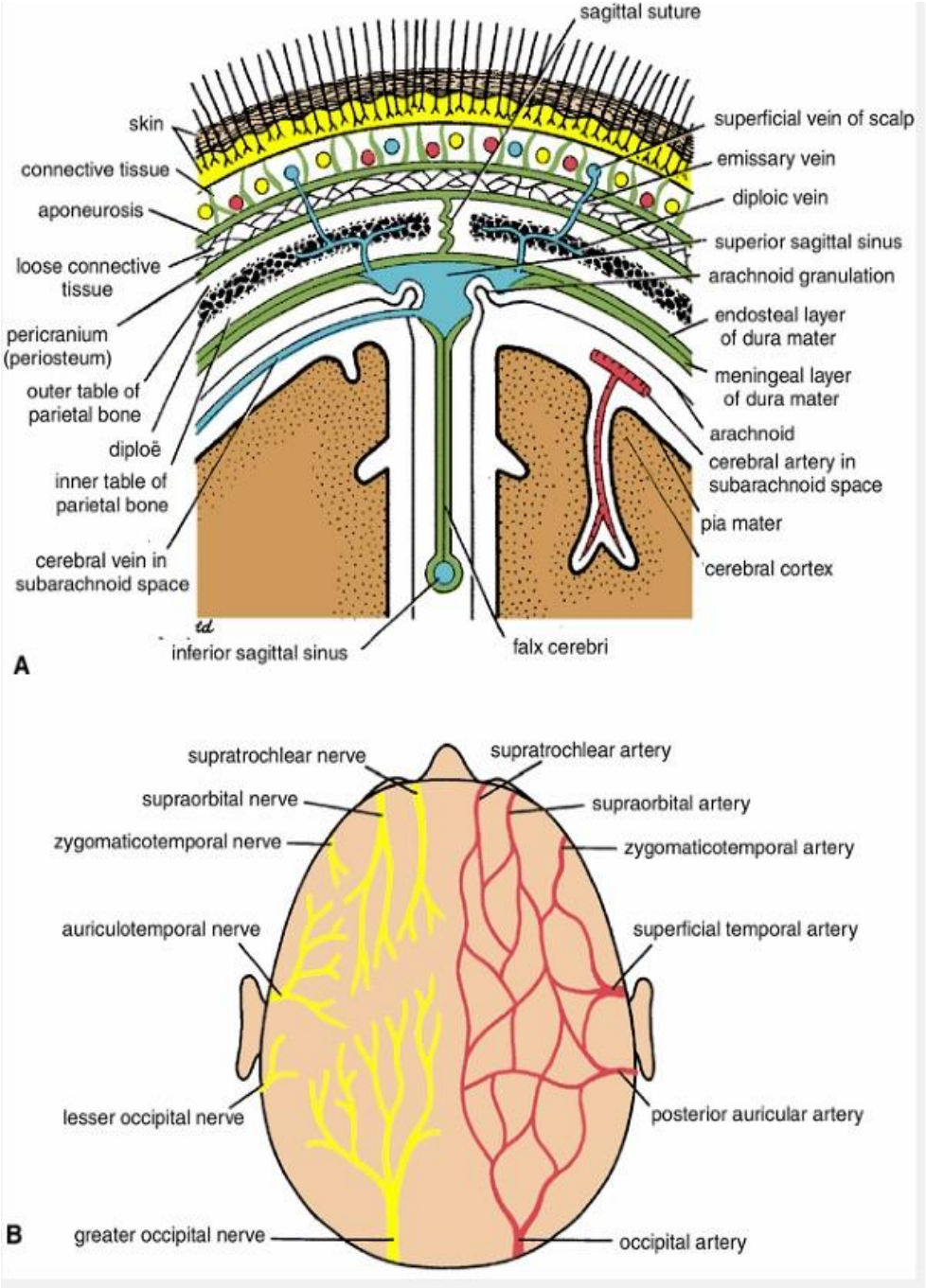
Muscles of Scalp

It extends from super-ciliary arches anteriorly to external occipital protuberance & superior nuchal lines posteriorly.

- **Scalp is composed of 5 layers**

1. **Skin.**
2. **2- Connective tissue (dense)**
3. **Aponeurotic layer.**
4. **Loose connective tissue.**
5. **Pericranium.**

Scalp is covered by occipito-frontalis muscle. It has frontal belly & occipital belly with aponeurotic tendon in between. Frontal belly is supplied by temporal branch of facial nerve while occipital belly is supplied posterior auricular branch of it.



Nerve supply of scalp:

5 nerves in front of the auricle:

4 sensory, all are branches from trigeminal nerve

1- Supra-trochlear.
2- Supra-orbital.
3- Zygomatico-temporal.
4- Auriculo-temporal.

One is motor which is the temporal branch of facial nerve.

5 nerves behind the auricle:

4 sensory all are branches from cervical plexus.

1- Great auricular nerve (C2 and C3).
2- Lesser occipital.
3- Greater occipital nerve (C2).
4- Third occipital nerve (C3).

One is motor which is posterior auricular branch of facial.

Vessels of the scalp:

5 arteries & 5 corresponding veins:

Two in front of auricle, all are branches from internal carotid artery

1- Ophthalmic artery.
2- Supra-trochlear & Supra-orbital from ophthalmic artery.

Three behind auricle, all are branches from external carotid artery

1- Superficial temporal artery.
2- Posterior auricular.
3-Occipital artery.

Muscles of the face (facial expressions) VII:

■ They are Sphincters and dilators, between bone and overlying skin:

Of the orbit:

■ Sphincter: orbicularis oculi

° Palpebral portion in the eyelids

° Orbital portion around the orbital margin

° Lacrimal portion related to lacrimal gland.

■ Dilator: occipito-frontalis, levator palpebrae scapularis.

Of the nose:

■ Compressor and dilator nares.

Of the mouth

■ Sphincter: orbicularis oris

■ Dilator:

° Levator labii superioris, levator anguli oris, zygomaticus major & minor

° Depressor labii inferioris, depressor anguli oris.

■ Buccinator defines the size of the cavity between cheek and teeth.

■ Platysma in the lateral neck pulls the mouth downwards.

Nerve supply of muscles of the face (muscles of expression):

■ All these muscles are supplied by terminal branches of facial nerve.

■ These terminal branches arise within substance of parotid gland.

They are 5 terminal branches of facial nerve:

1- Temporal. 2- Zygomatic.

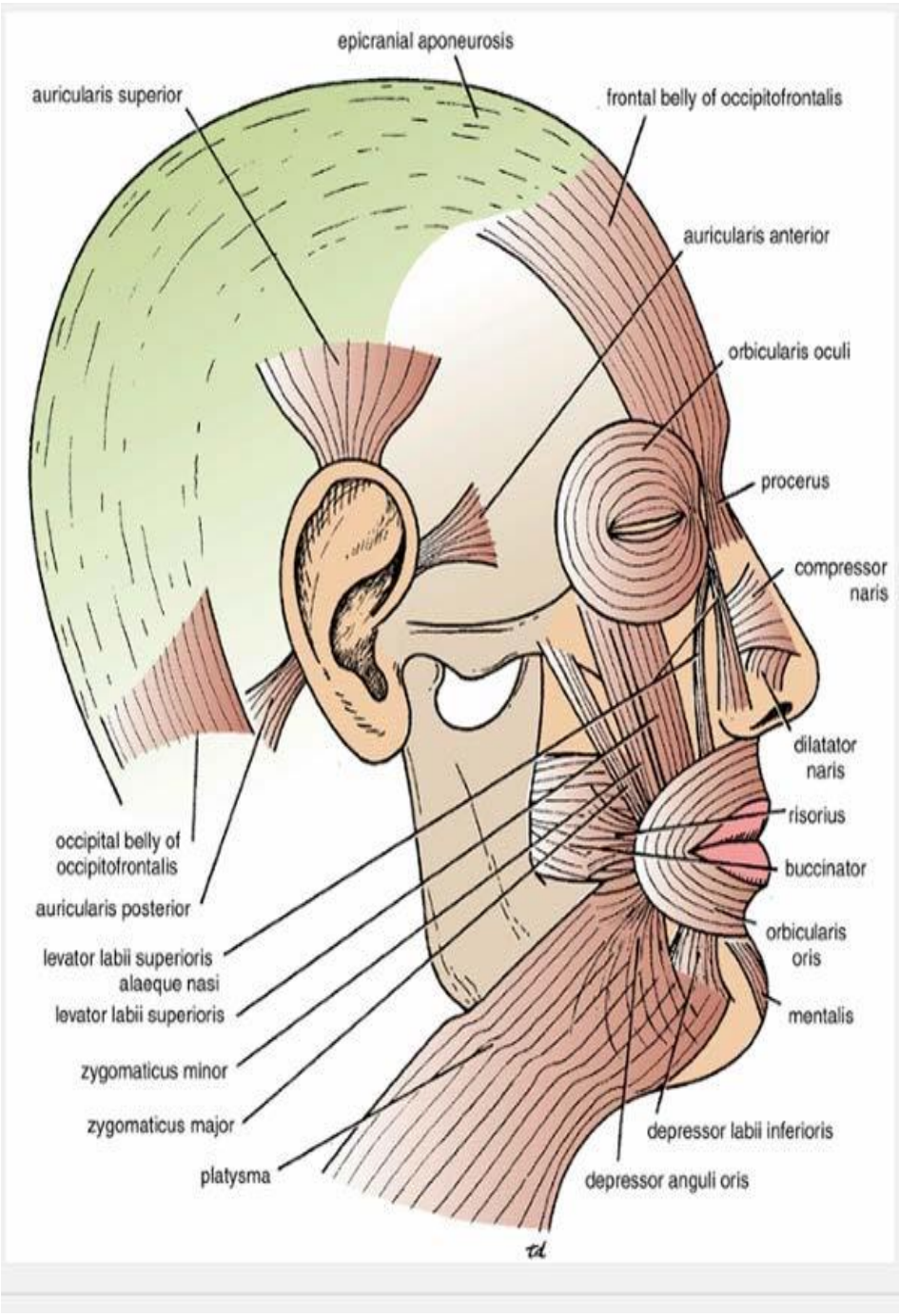
3- Buccal. 4-Mandibular.

5- Cervical.

■ Facial nerve gives also three branches before it enters the gland (as it emerges from stylo-mastoid foramen):

1-Nerve to posterior belly of diagastric. 2-Nerve to stylo-hyoid.

3- Posterior auricular nerve.

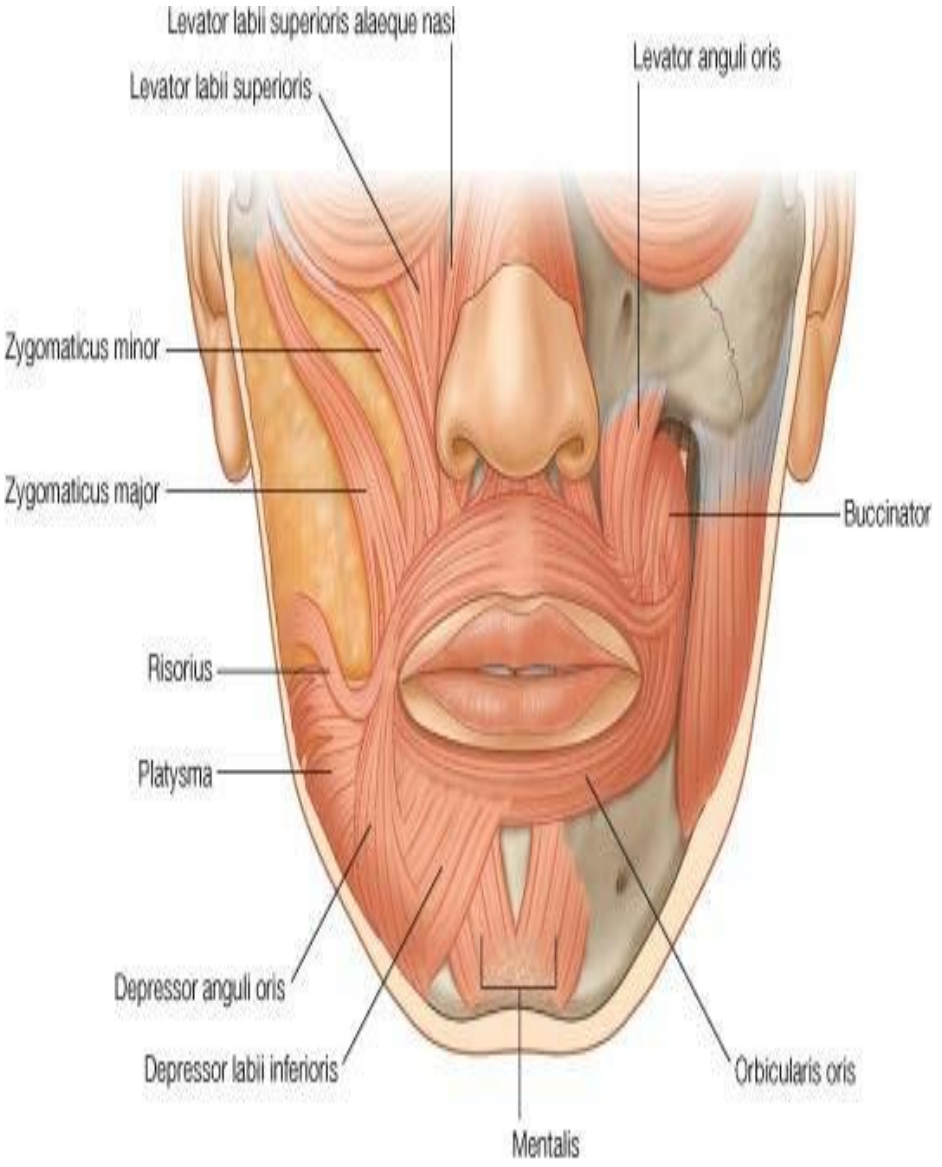


Orbicularis oculi is a large muscle that completely surrounds each orbital orifice and extends into each eyelid. It closes the eyelids. It has two major parts:
1-Outer orbital part is a broad ring that encircles the orbital orifice and extends beyond the orbital rim.
2- Inner palpebral part is in eyelids consists of muscle fibers originate in medial corner of eye that arches across each lid to attach laterally.
An additional small lacrimal part is deep, medial in position, and attaches to bone posterior to the lacrimal sac of the lacrimal apparatus in the orbit.

Orbicularis oris

It is a complex muscle consisting of fibers that completely encircle the mouth. Its function occurs during whistling.
Some of its fibers originate near the midline from the maxilla superiorly and mandible inferiorly, while other fibers are derived from both buccinator, in the cheek, and numerous other muscles acting on lips.
It inserts into skin and mucous membrane of lips, and into itself. Contraction of it narrows mouth, closes lips

Buccinator defines the size of the cavity between cheek & teeth.
It arises from the posterior part of the maxilla and mandible opposite the molar teeth. Fibers of the buccinator pass towards the corner of the mouth to insert into lips.



Nerve supply of muscles of the face (muscles of expression):

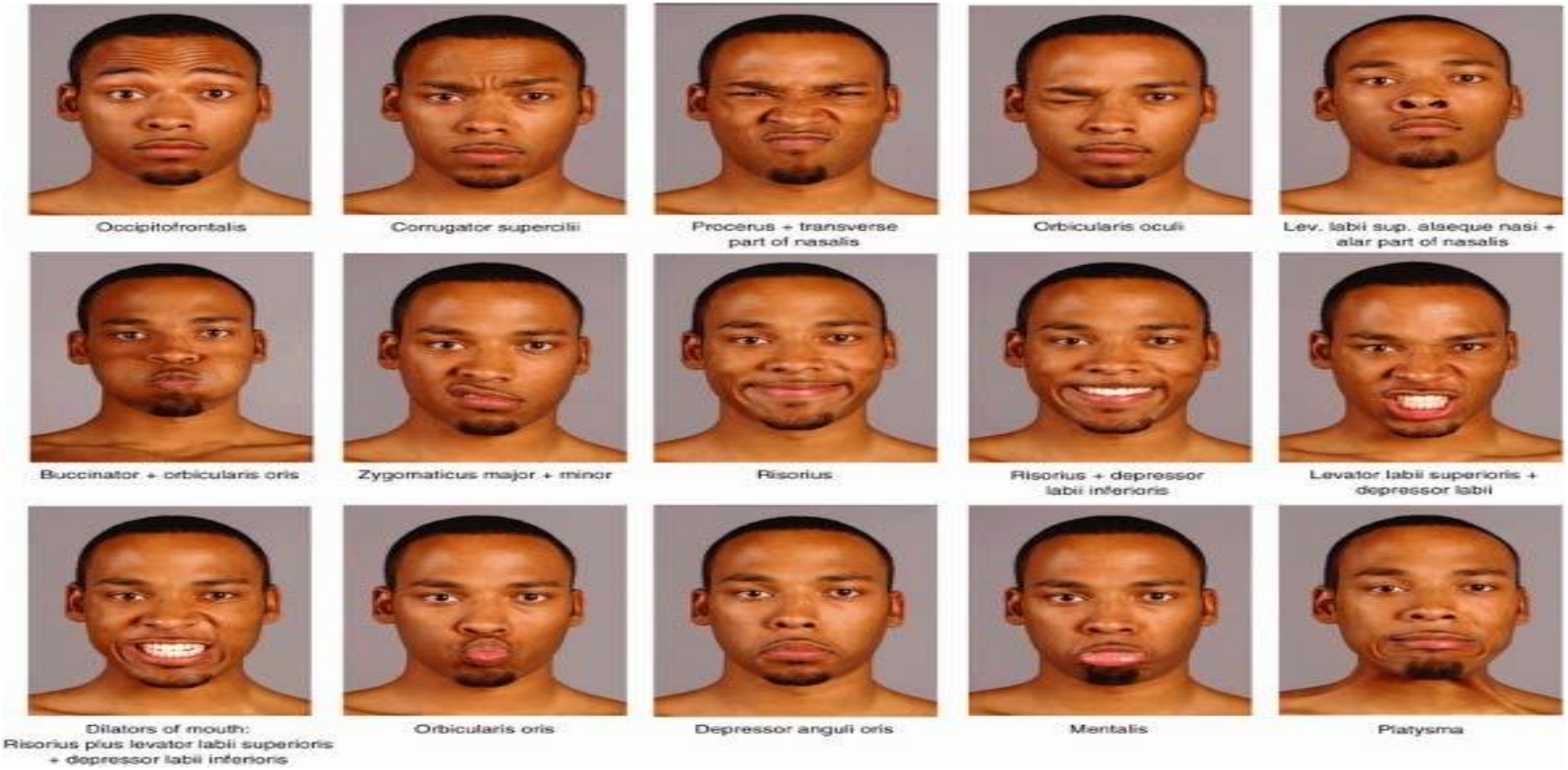
- All these muscles are supplied by terminal branches of facial nerve.
- These terminal branches arise within substance of parotid gland.

Common characters of facial muscles:

1- Common nerve supply (facial nerve).

2- They insert in skin of face

3- Common action (different facial expressions).

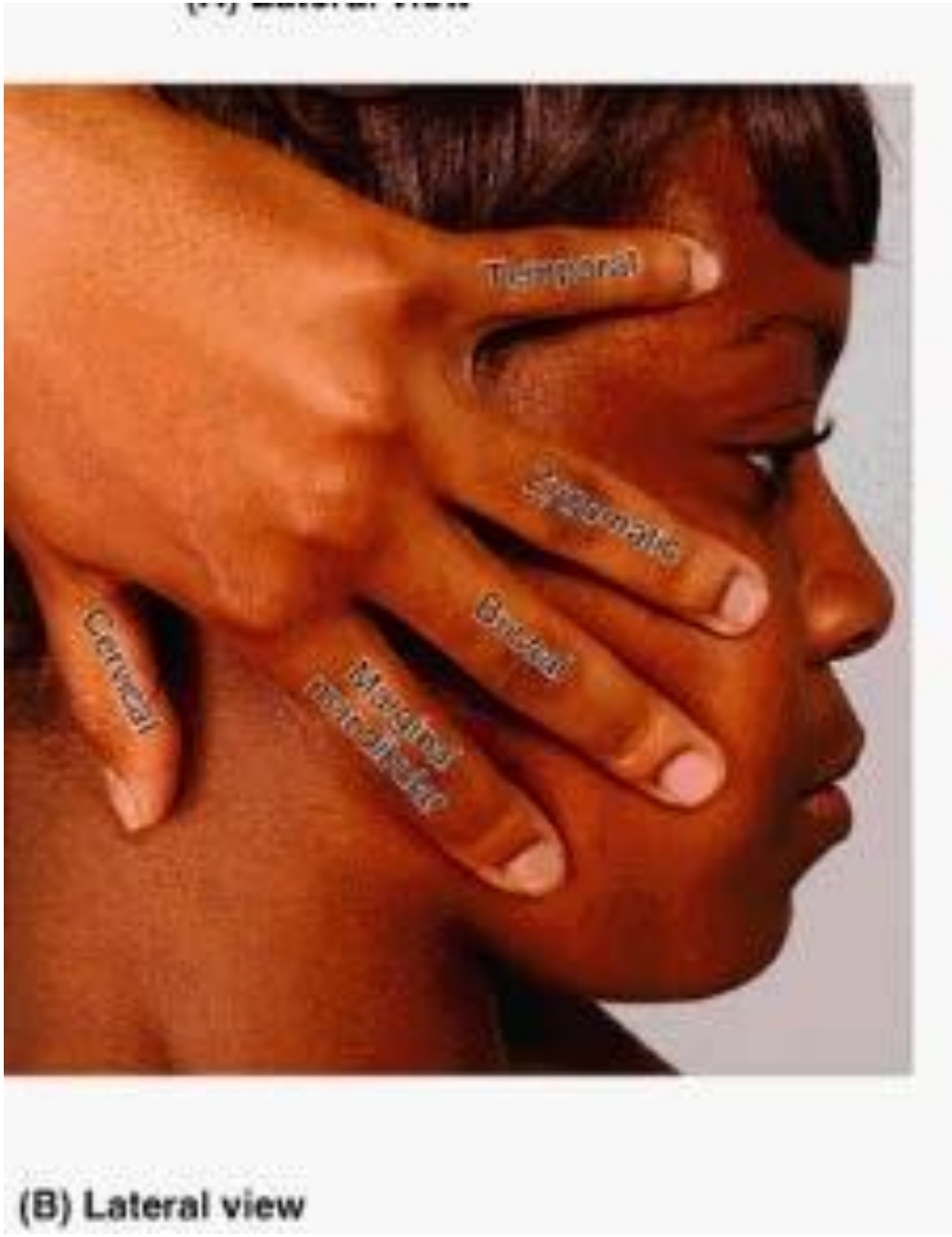


They are 5 terminal branches of facial nerve

1- Temporal.
2- Zygomatic.
3- Buccal.
4- Mandibular.
5- Cervical.

- Facial nerve also gives 3 branches as it emerges from the stylo-mastoid foramen that lies between styloid & mastoid processes.

1- Nerve to posterior belly of diagastric.
2- Nerve to stylo-hyoid.
3- Posterior auricular nerve.



(B) Lateral view

Muscles of the Eye

1- Extrinsic muscles:

Actions on cornea:

- Superior rectus III: up, medial
- Inferior rectus III:down, medial
- Medial rectus III: medial rotation.
- Inferior oblique III: up, lateral
- Lat. rectus VI: lateral rotation
- Superior oblique IV: down, lateral

2- Intrinsic muscles made of smooth muscle.

Actions:

- Sphincter pupillae of iris III: constriction of pupil
- Dilator pupillae of iris
- Sympathetic nervous system: dilation of pupil
- Ciliary muscle III: fattens lens.

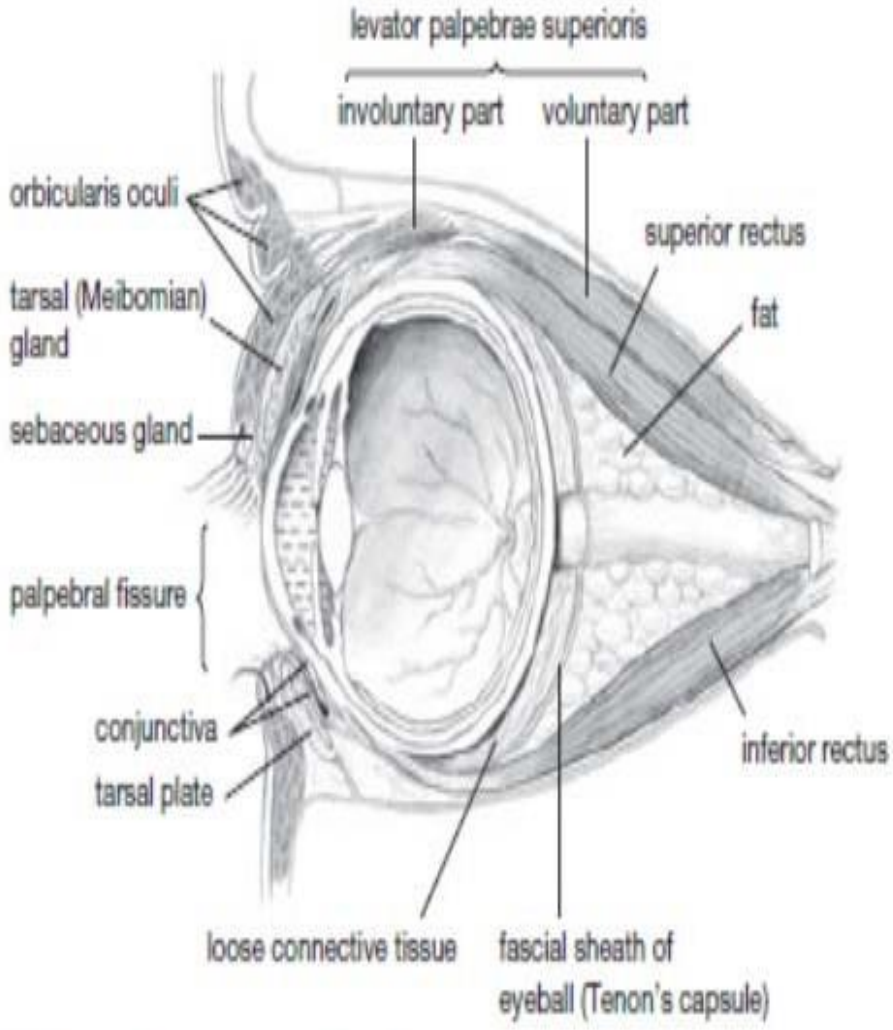


Fig. 11.24 Sagittal section through orbit.

Muscles of mastication:

They are 4 that acting on mandible (Temporo Mandibular (TM J):

- Elevate the mandible, close the mouth by:
- Masseter VIII
- Temporalis VIII (also retracts by its posterior fibers)
- Medial pterygoid side to side or chewing movements VIII
- Depress the mandible, open the mouth by:
- Lateral pterygoid powerful protractor and chewing VIII.
- In addition, digastric, stylohyoid, and mylohyoid depress and geniohyoid elevates the mandible. All muscles of mastication are supplied by branches from mandibular part of trigeminal nerve.

Muscles of the tongue:

Extrinsic muscles (2 above & 2 below):

- Genioglossus XII protracts tongue (lifesaving muscle)
- Styloglossus XII elevates, retracts
- Hyoglossus XII depresses
- Palato-glossus from pharyngeal plexus and elevates tongue.

Intrinsic muscles:

- Longitudinal, transverse, vertical fibres XII alter shape of tongue.

Muscles of the soft palate:

- Tensor palatine VIII tenses soft palate
- Levator palatine X, XI via pharyngeal plexus elevates soft palate
- Palato-pharyngeus pharyngeal plexus depresses soft palate
- Palatoglossus depresses soft palate
- Uvular muscle pharyngeal plexus elevates uvula.

Muscles of the pharynx:

- **Outer constrictor muscles of the pharynx are three circular muscles overlapping muscles—Superior, Middle, and Inferior constrictor muscles pharyngeal plexus—which contract sequentially during swallowing to propel the bolus of food downwards.**
- **Inner, longitudinal muscles are three also (non constrictors) Palate-pharyngeus and Salpingo-pharyngeus supplied by pharyngeal plexus, and Stylo-pharyngeus supplied by IX.**
- **They shorten the pharynx and elevate the larynx to close the laryngeal inlet against the base of the tongue during swallowing.**

Muscles of the larynx:

- **Intrinsic muscles X modify the shape of the airway through the larynx. They include:**
  - **Cricothyroid**
  - **Cricoarytenoid**
  - **Thyroarytenoid**
  - **Interarytenoid.**
- **These muscles have roles in regulating airway diameter during swallowing, coughing, and vocalization.**

Muscles of the neck:

1-Trapezius XI elevates, retracts, and laterally rotates scapula

2-PlatysmaVII depresses skin of lower part offace, mandible, mouth.

3- Sterno-mastoidSpinal part XI. Flexesneck to same side (unilateral)and rotates neckto opposite side (bilateral).

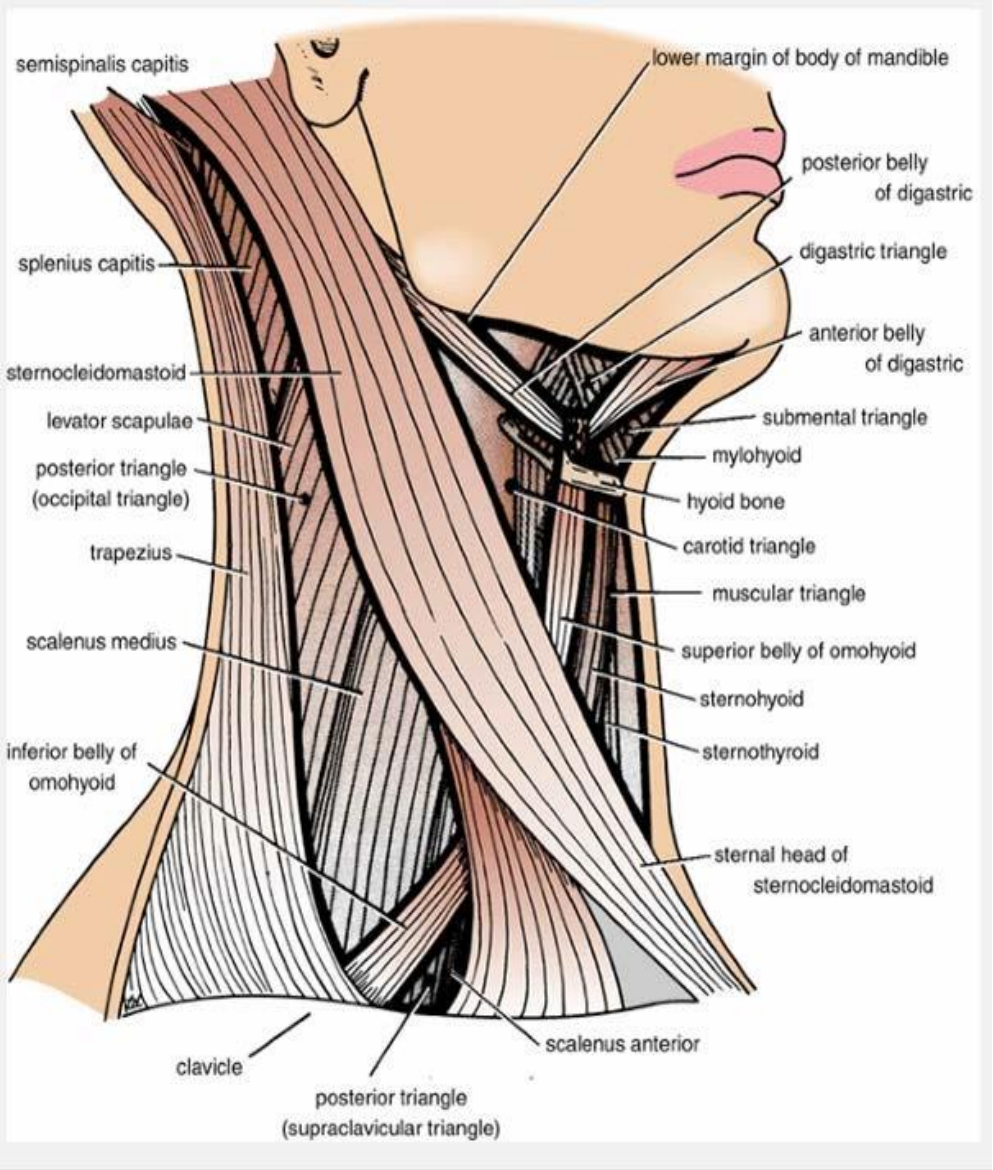
4- Scalene muscles C3–8 laterally flex, rotate neck

5- Suprahyoid muscleselevate the hyoid: digastric VII; stylohyoid VII; mylohyoid VII; geniohyoid C.1

6- Infra-hyoid ('strap') muscles:

Depress hyoid: sternohyoid C1,3; thyrohyoid C1; omohyoid C1, 2, 3.

Depress larynx: sternothyroid C1, 2, 3.



Triangles of the neck:

The posterior triangle:

Boundaries:

- Anterior border—sternomastoid
- Posterior border—trapezius
- Base—clavicle
- Apex---meeting of anterior & posterior borders.

Contents:

- Roots of brachial plexus
- Spinal part of accessory nerve
- Subclavian vein
- Subclavian artery and branches
- Branches of cervical plexus
- Lymph nodes.

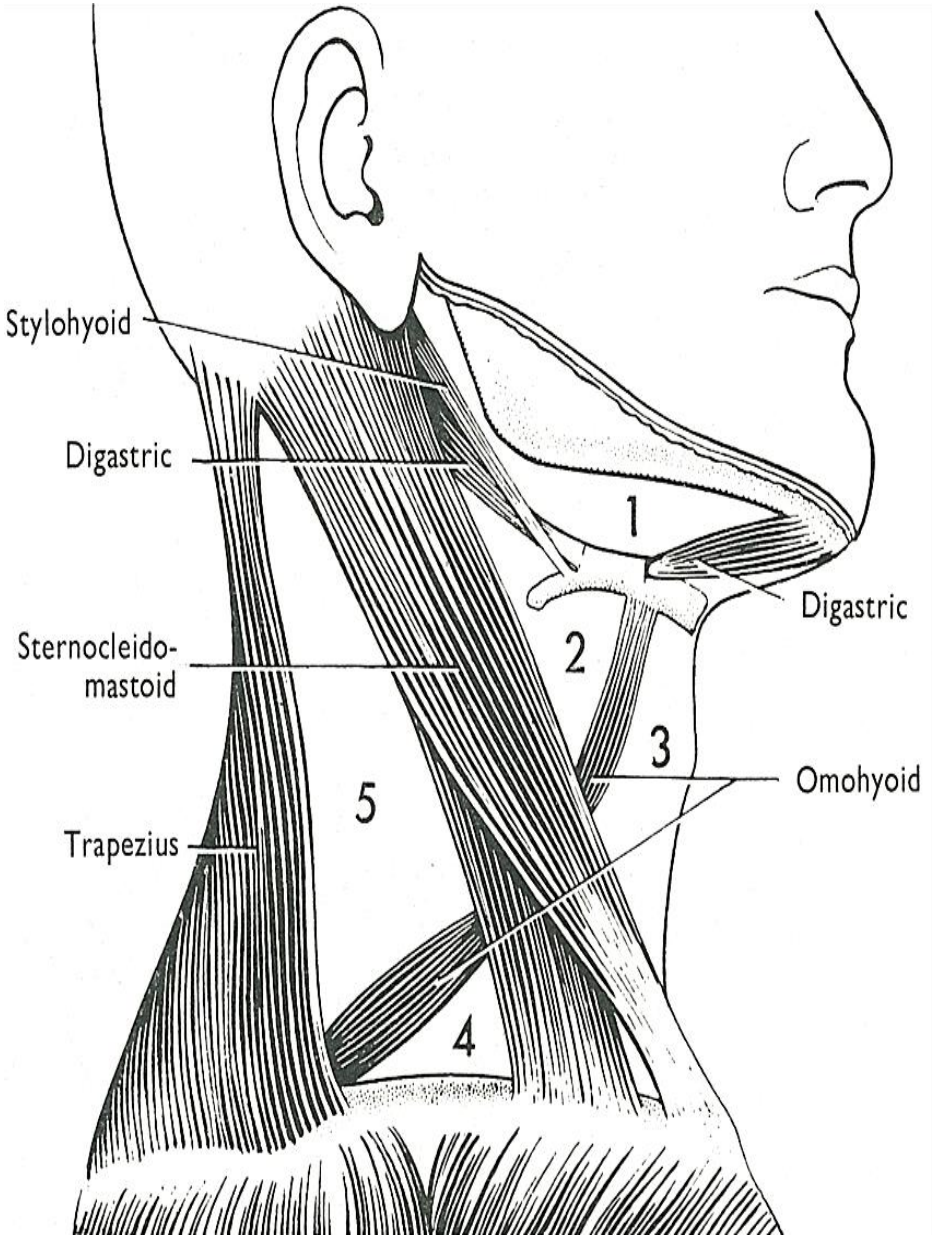
The anterior triangle:

Boundaries:

- Superior—mandible
- Lateral—sternomastoid
- Medial—midline of the neck

Contents:

- Pharynx, larynx, oesophagus, trachea
- Thyroid, parathyroid, submandibular, parotid glands
- Suprahyoid and infrahyoid muscles
- Glossopharyngeal, vagus, hypoglossal nerves, sympathetic chain
- Strap muscles and their nerve supply (ansa cervicalis C1, 2, 3)
- Carotid arteries and branches
- Internal and external jugular veins.



Within the anterior triangle, four smaller triangles are present:

1- Superior carotid (diagastric or sub-mandibular triangle) contains sub-mandibular salivary gland.

2- Inferior carotid (carotid or vascular triangle) contains common carotid artery, internal jugular vein and vagus nerve inbetween.

3- Infrahyoid (muscular triangle) contains four infrahyoid muscles.

4- Submaxillary (submental triangle) is a single triangle that contains mylohyoid muscle and the submental lymph nodes,

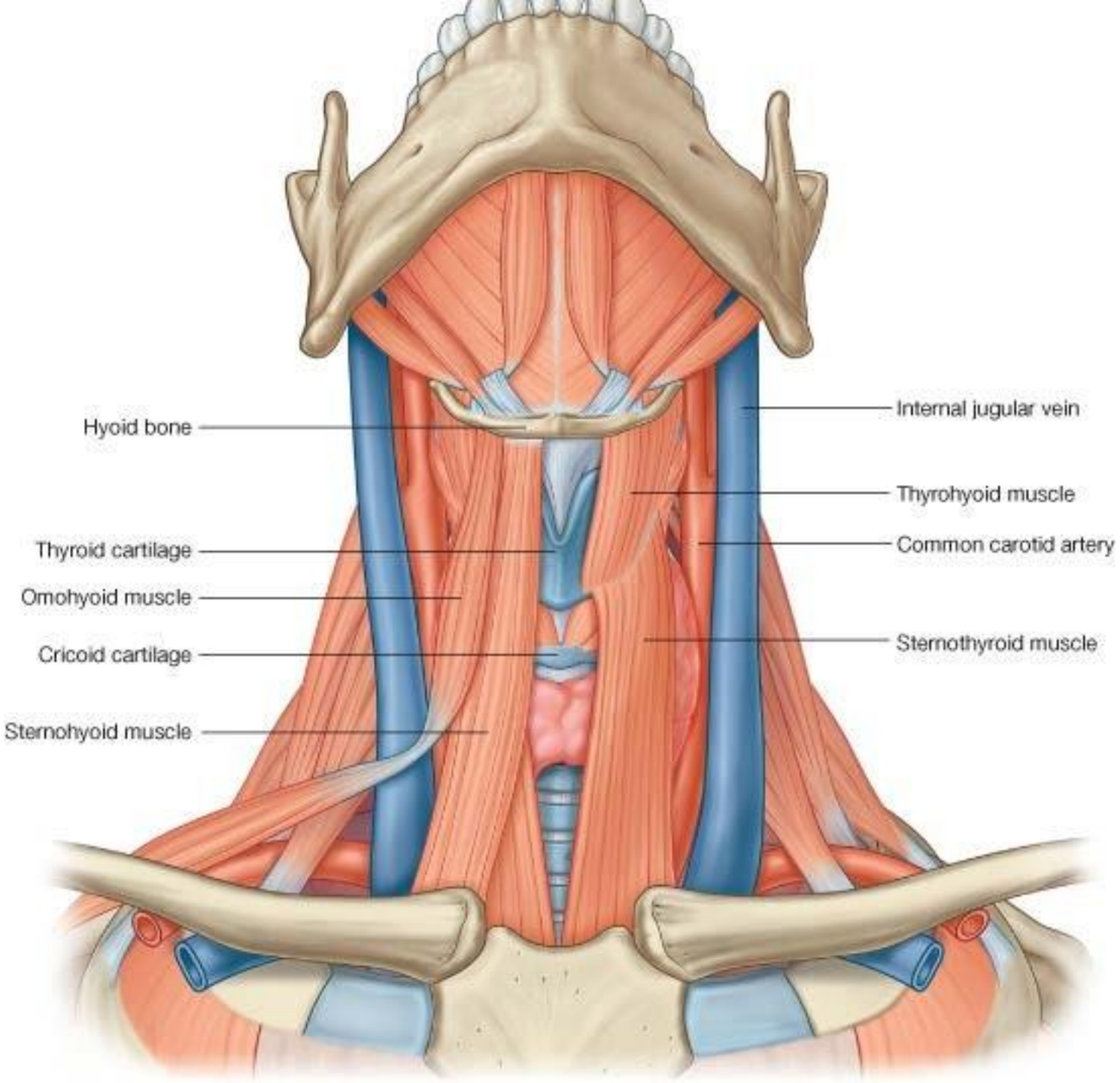
- These triangles are created by the two bellies of digastric muscle and the two bellies of omohyoid muscle.

Supra-hyoid muscles

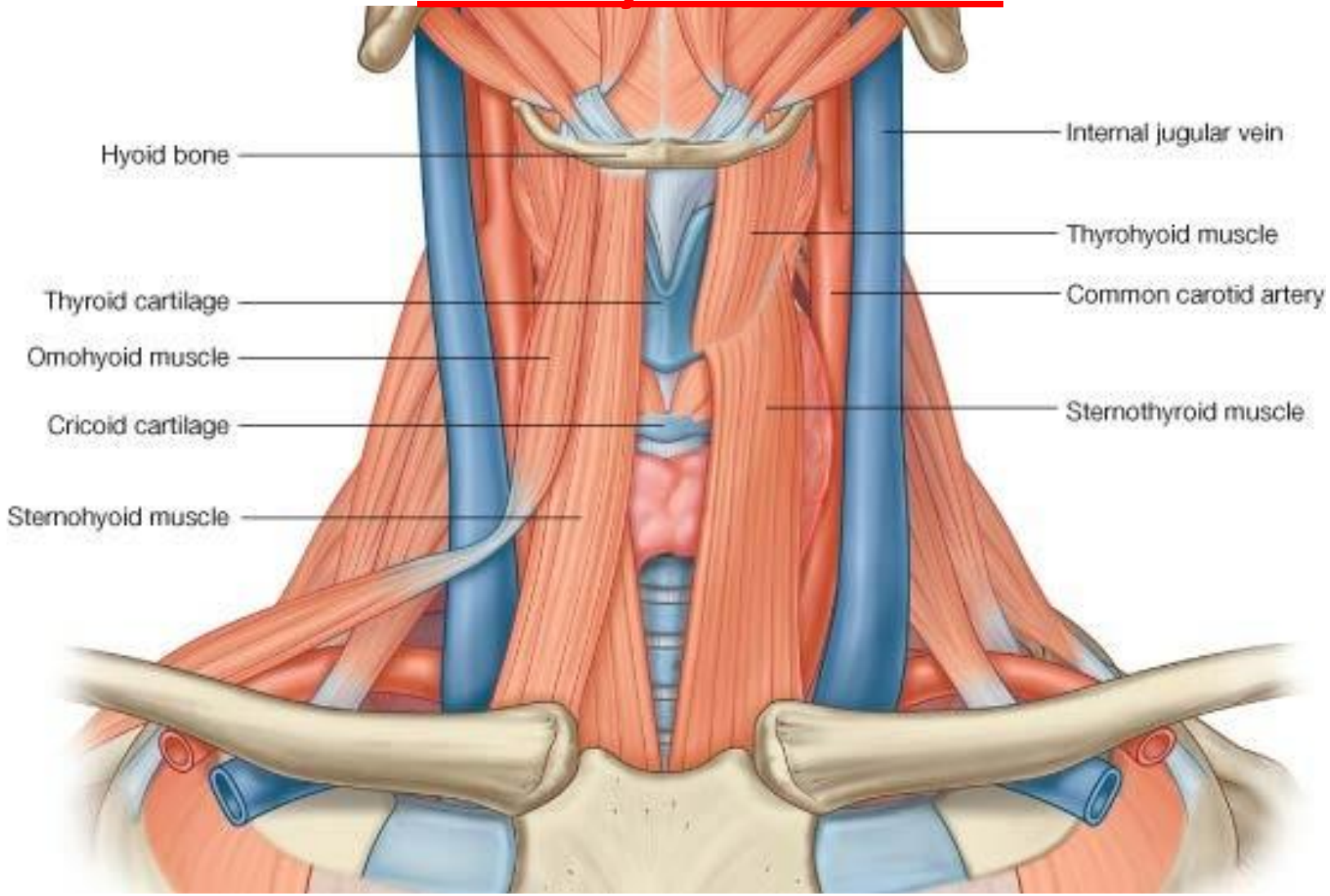
Muscle	Origin	Insertion	Nerve Supply	Action
Digastric Posterior belly	Mastoid process of temporal bone	Intermediate tendon is held to hyoid by fascial sling	Facial nerve	Depresses mandible or elevates hyoid bone
Anterior belly	Body of mandible		Nerve to mylohyoid	
Stylohyoid	Styloid process	Body of hyoid bone	Facial nerve	Elevates hyoid bone
Mylohyoid	Mylohyoid line of body of mandible	Body of hyoid bone and fibrous raphe	Inferior alveolar nerve	Elevates floor of mouth and hyoid bone or depresses mandible
Geniohyoid	Inferior mental spine of mandible	Body of hyoid bone	First cervical nerve	Elevates hyoid bone or depresses mandible

• Infra-hyoid muscles

muscle	origin	insertion	Nerve supply	action
Sternohyoid	Manubrium sterni and clavicle	Body of hyoid bone	Ansa cervicalis; C 1, 2, and 3	Depresses hyoid bone
Sternothyroid	Manubrium sterni	Oblique line on lamina of thyroid cartilage	Ansa cervicalis; C 1, 2, and 3	Depresses larynx
Thyrohyoid	Oblique line on lamina of thyroid cartilage	Lower border of body of hyoid bone	First cervical nerve	Depresses hyoid bone or elevates larynx
Omohyoid				
Inferior belly	Upper margin of scapula and suprascapular ligament	Intermediate tendon is held to clavicle and first rib by fascial sling	Ansa cervicalis; C 1, 2, and 3	Depresses hyoid bone
Superior belly	Lower border of body of hyoid bone			

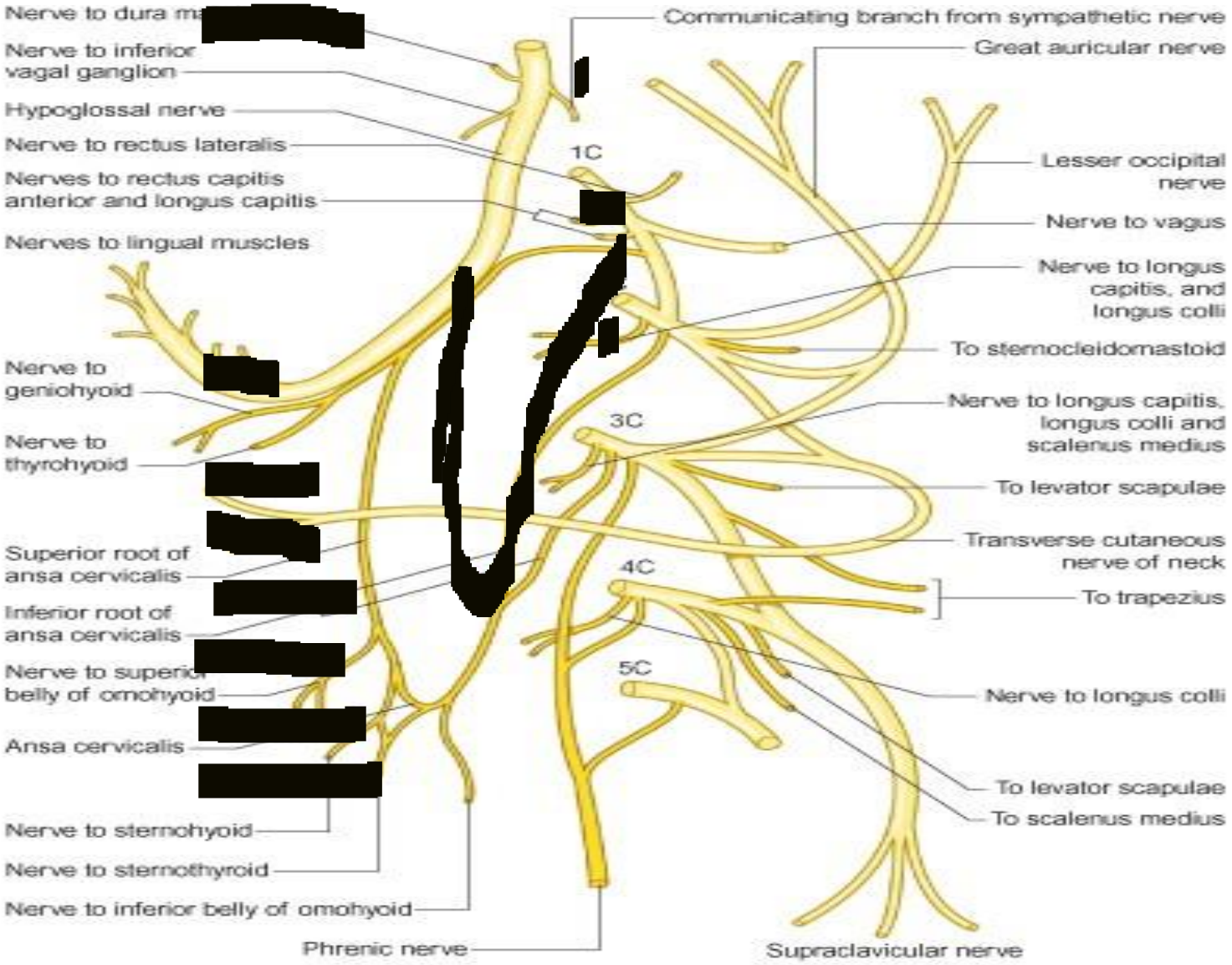

Hyoid bone
Thyroid cartilage
Omohyoid muscle
Cricoid cartilage
Sternohyoid muscle
Internal jugular vein
Thyrohyoid muscle
Common carotid artery
Sternothyroid muscle

Infra-hyoid muscles



The four infr-ahyoid muscles are in the muscular triangle. They attach the hyoid bone to inferior structures and depress the hyoid bone. They also provide a stable point of attachment for the supra-hyoid muscles. Because of their appearance, they are sometimes referred to as the **'strap muscles'**.

Ansa-cervicalis loop supplying infra-hyoid muscles



MUSCLES OF THE BACK

Complex but divisible into 3 groups (in layers) with different functions:

A. SUPERFICIAL LAYER - move upper extremity (arm)

B. INTERMEDIATE LAYER- Respiratory muscles (insert to ribs)

C. DEEP LAYER - move trunk and back

Muscles of the Back - Superficial Group

TRAPEZIUS

Origin: medial 1/3 of superior nuchal line, external occipt. protuberance, ligamentum nuchae, spinous processes of vertebrae C7-T12

Insertion: lateral third of the clavicle, medial side of the acromion and the upper crest of the scapular spine, tubercle of the scapular spine

Action: elevates and depresses the scapula (depending on which part of the muscle contracts); rotates the scapula superiorly; retracts scapula

N.S.: motor: spinal accessory (XI), proprioception: C3-C4

Rhomboideus major

Origin: spines of vertebrae T2-T5

Insertion: medial border of the scapula inferior to the spine of the scapula

Action: retracts, elevates and rotates the scapula inferiorly

N.S.: dorsal scapular nerve (C5)

Rhomboideus minor

Origin: inferior end of ligamentum nuchae, spines of vertebrae C7 & T1

Insertion: medial border of the scapula at the root of the spine of the scapula

Action: retracts, elevates and rotates the scapula inferiorly

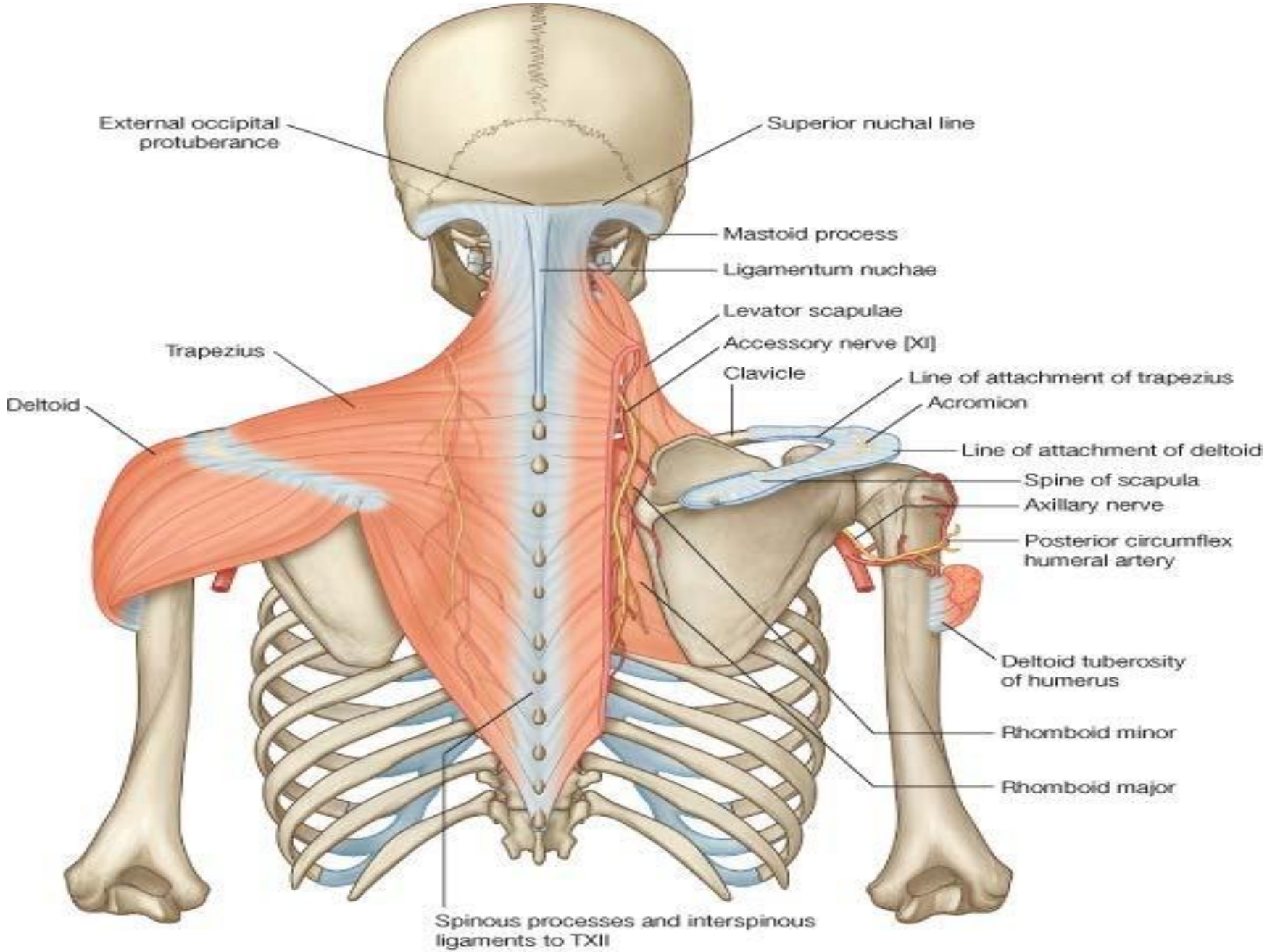
N.S.: dorsal scapular nerve (C5)

LATISSIMUS DORSI

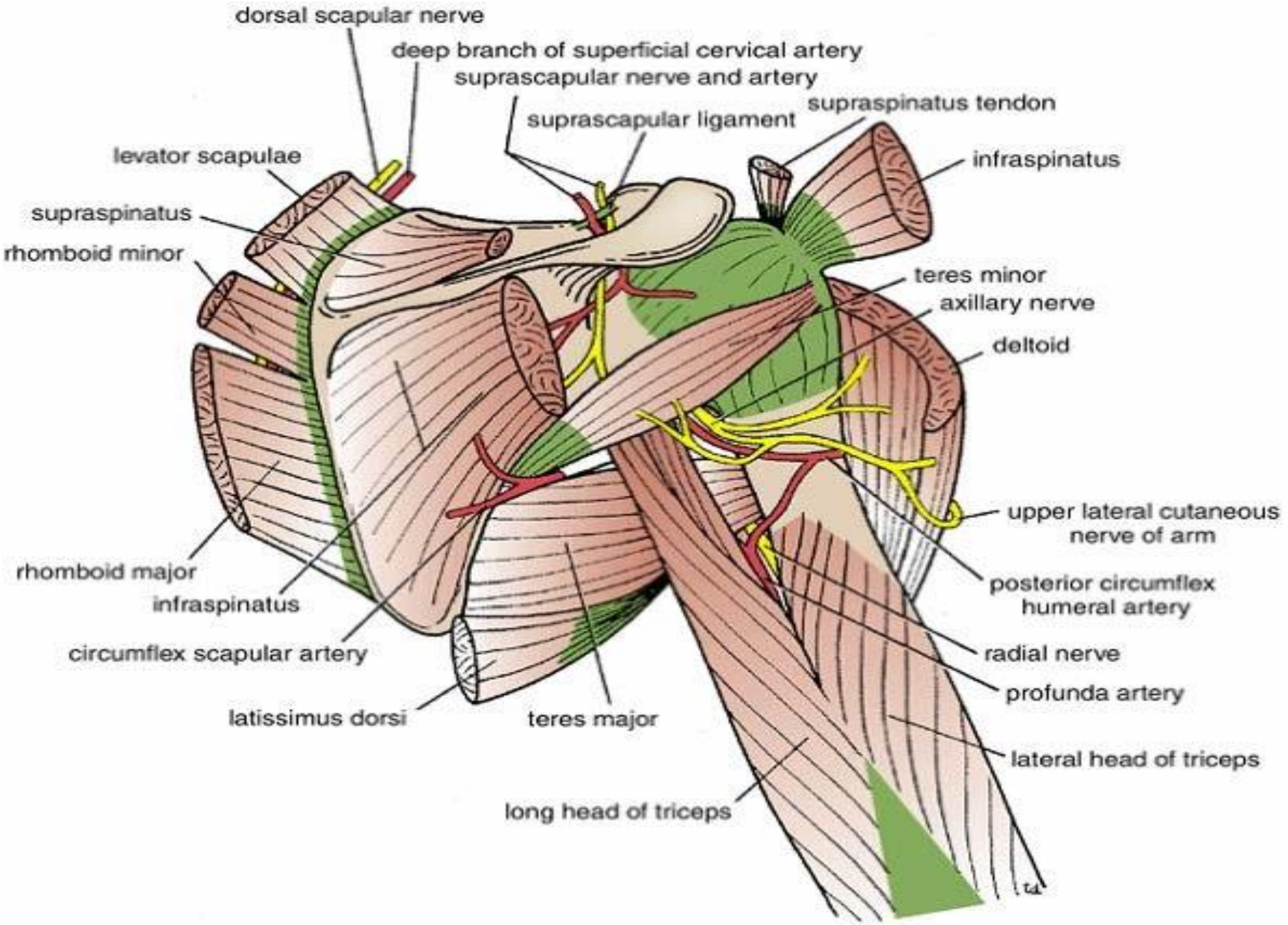
Origin:
vertebral spines from T7 to the sacrum, posterior third of the iliac crest, lower 3 or 4 ribs, sometimes from the inferior angle of the scapula
Insertion: floor of the intertubercular groove
Action: extends the arm and rotates the arm medially
N.S.: thoraco-dorsal nerve (C7,8) from the posterior cord of the brachial plexus.

LEVATOR SCAPULAE

Origin: transverse processes of C1-C4 vertebrae
Insertion: medial border of the scapula from the superior angle to the spine
Action: elevates the scapul
N.S.: dorsal scapular nerve (C5); the upper part of the muscle receives branches of C3 & C4



Dorsal Scapular Muscles



Muscles of the Back - Intermediate Group

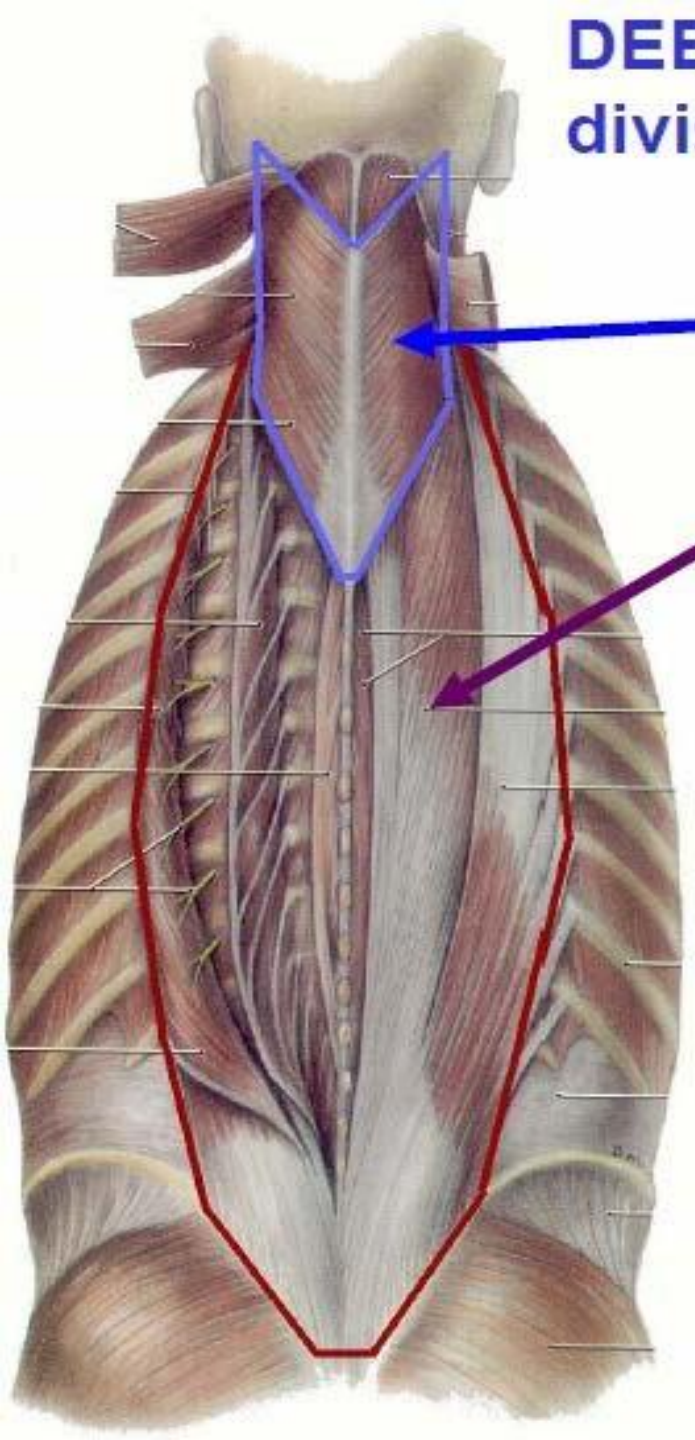
Muscle	Origin	Insertion	Action	Innervation
serratus posterior superior	ligamentum nuchae, spines of vertebrae C7 and T1-T3	ribs 2-5, lateral to the angles	elevates the upper ribs	branches of the ventral primary rami of spinal nerves T1-T4
serratus posterior inferior	thoracolumbar fascia, spines of vertebrae T11-T12 and L1-L2	ribs 9-12, lateral to the angles	pulls down lower ribs	branches of the ventral primary rami of spinal nerves T9-T12

DEEP GROUP- divisible into 3 subgroups: Splenius, Erector Spinae, Transversospinalis

DEEP MUSCLES OF THE BACK - Atlas Figs. 4.30 - 4.34

MUSCLE	ORIGIN	INSERTION	ACTION	NERVE
Splenius	**Vertebrae** - Spines of T1-T4	**Splenius Capitis to Skull** - Occipital and temporal bones **Splenius Cervicis to Vertebrae** - Transverse processes of C2-C3	Extend neck and head (rotate in unilateral action)	Dorsal rami of spinal nerves
Erector Spinae 1) Iliocostalis 2) Longissimus 3) Spinalis	1) **Iliocostalis from Ilium and ribs** 2) **Longissimus from transverse processes of vertebrae** 3) **Spinalis from spinous processes**	1) **Iliocostalis to ribs and transverse processes** 2) **Longissimus to transverse processes of vertebrae** 3) **Spinalis to spinous processes**	Extend trunk and vertebral column	Dorsal rami of spinal nerves
Transverso-spinalis 1) Semispinalis 2) Multifidus 3) Rotatores	All take origin from **transverse processes of vertebrae**	All insert upon **spines of vertebrae superior to origin**: Differ in how many vertebrae they extend across 1) Semispinalis extend across 5 or 6 vertebrae 2) Multifidus extend across 3 or 4 vertebrae 3) Rotatores extend across 1 or 2 vertebrae	All extend trunk in bilateral action and rotate vertebral column in unilateral action	Dorsal rami of spinal nerves

- all extend trunk of neck when act bilaterally
- all located dorsal to vertebral column
- all innervated by dorsal rami of spinal nerves

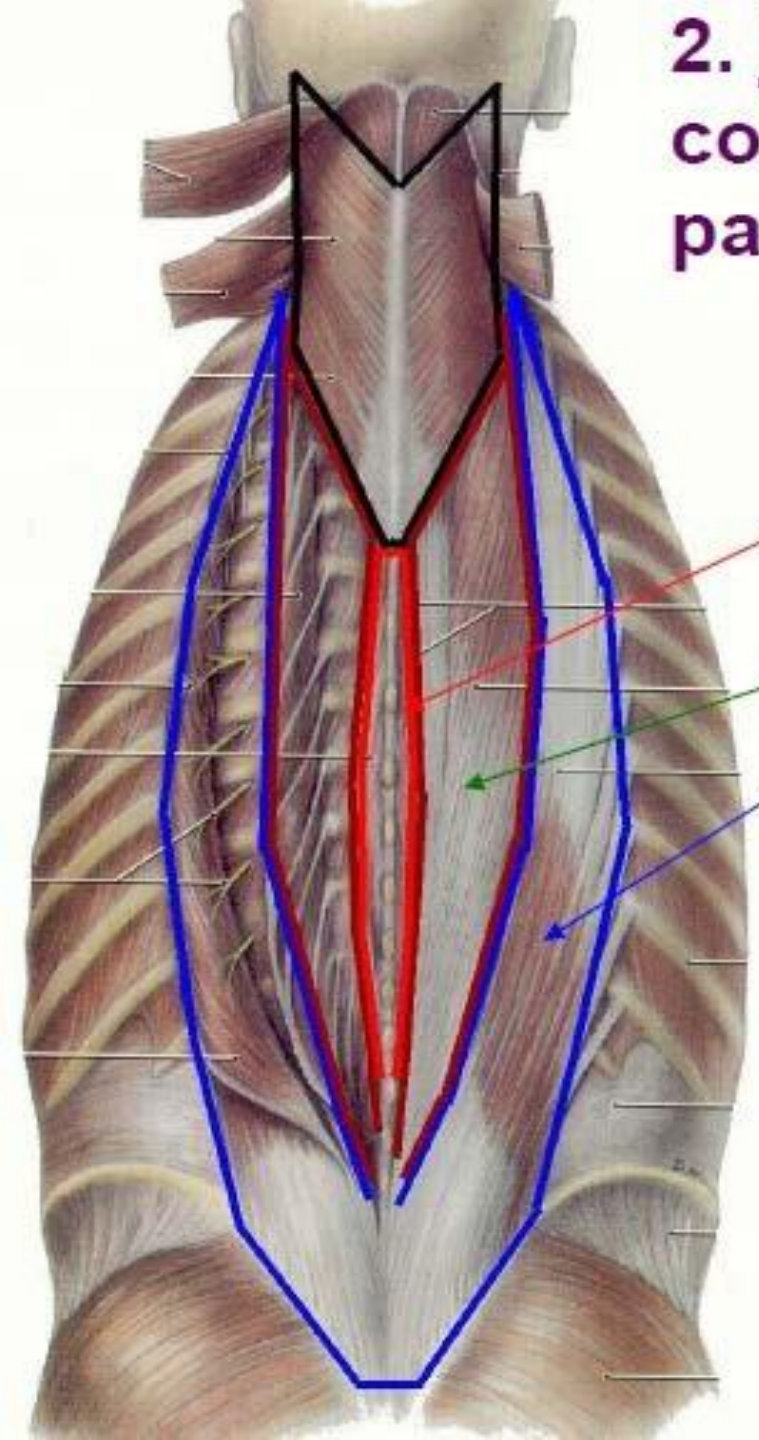


DEEP GROUP OF BACK MUSCLES
divisible into three subgroups

1. SPLENIUS
2. ERECTOR SPINAE
3. TRANSVERSO-SPINALIS – deep to Erector Spinae

ALL

1. Act to Extend trunk when act bilaterally
2. Located dorsal to vertebral column
3. Innervated by Dorsal primary rami of spinal nerves



2. ERECTOR SPINAE- three columns of muscle lying in parallel

SPINALIS- most medial

LONGISSIMUS- intermediate

ILIOCOSTALIS- lateral

The sub-occipital triangle & its muscles

These muscles are involved in maintenance of posture, as well as extension and rotation of the head on C1.

They are found in sub-occipital triangle (the area between the occipital bone and the posterior part of C1 and C2).

Four muscles are involved in sub-occipital triangle

1-Rectus capitis posterior major
2-Rectus capitis posterior minor
3-Inferior oblique
4-Superior oblique.

Blood supply of the back musculature

Arterial supply: According to region:

Cervical

- **Occipital artery (from the external carotid artery)**
- **Ascending cervical artery (from inferior thyroid artery)**
- **Deep cervical artery (from the costo-cervical trunk)**
- **Vertebral artery (from the subclavian artery)**

Thoracic: Posterior intercostals.

Lumber: Lumber & subcostal.

Sacral: Ilio-lumbar& lateral sacral arteries (internal iliac artery)

Venous drainage

Venous drainage of back is divided into 2 different systems:

- **External vertebral venous plexus lies outside vertebral canal**
- **Internal vertebral venous plexus lies inside vertebral canal, but external to dura mater of spinal cord.**

The two plexuses communicate freely with veins in neck, thorax, abdomen, and pelvis. The basilar and occipital venous sinuses (in the head) communicate with the plexuses via the foramen magnum.

Nerve supply of the back

Posterior rami of spinal nerves supply muscles and skin of the back.

Anterior abdominal wall

Its layers consist of:

1- Skin.
2-Superficial fascia
3-Muscles
4-extraperitoneal fascia
5-parietal peritoneum

Antero-lateral muscles

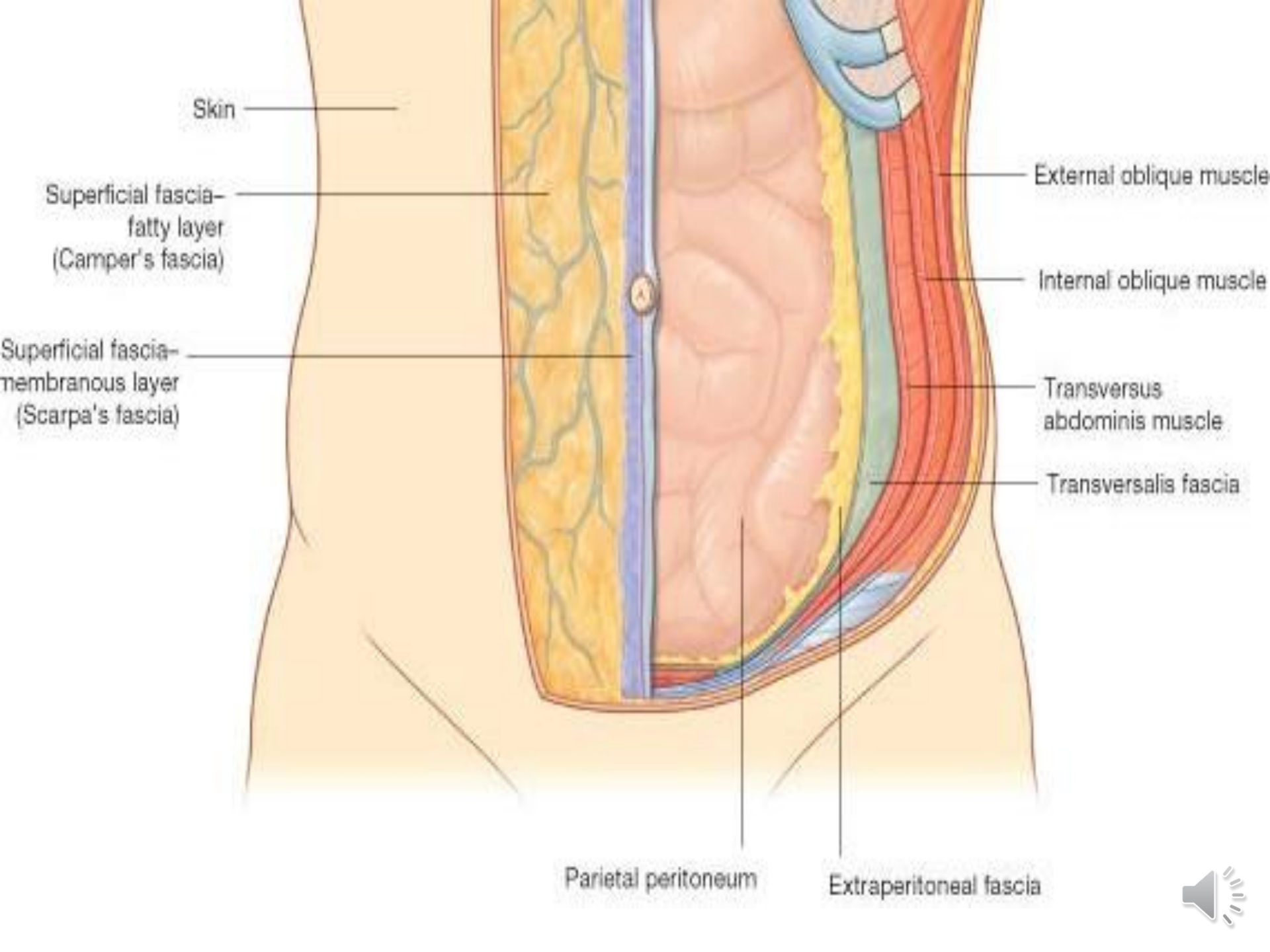
There are 5 muscles inantero-lateral group of abdominal wall:

*** 3 flat muscles begin postero-laterally, pass anteriorly, and are replaced by an aponeurosis as the muscle continues towards midline:**

1- External oblique.
2- Internal oblique.
3- Transversusabdominis

*** 2 vertical muscles:**

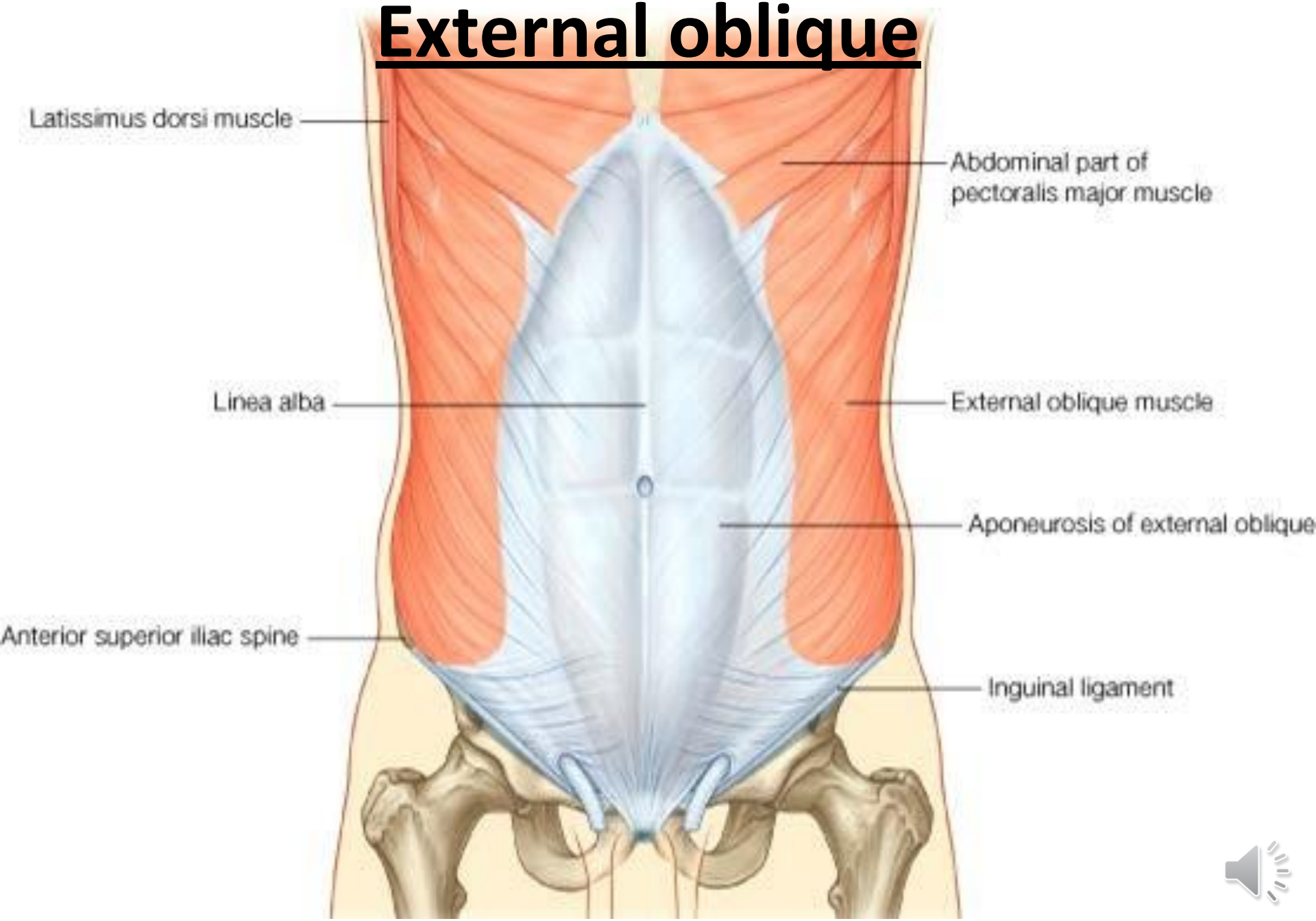
1- Rectus abdominis.
2- Pyramidalis) near midline, which are enclosed within a tendinous sheath formed by the aponeuroses of the flat muscles.

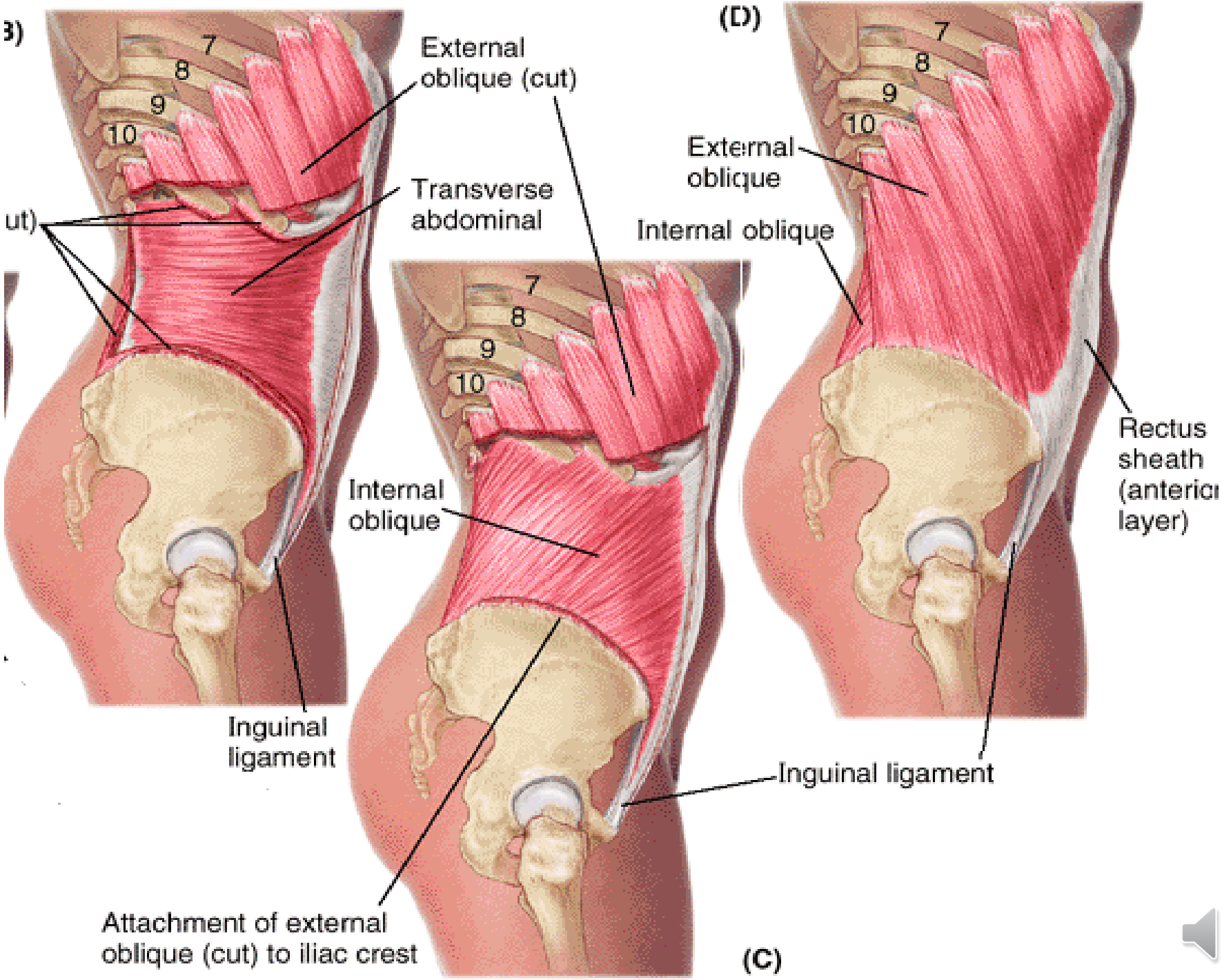

Skin
Superficial fascia–
fatty layer
(Camper's fascia)
Superficial fascia–
membranous layer
(Scarpa's fascia)
External oblique muscle
Internal oblique muscle
Transversus
abdominis muscle
Transversalis fascia
Parietal peritoneum
Extraperitoneal fascia

Anterolateral muscles

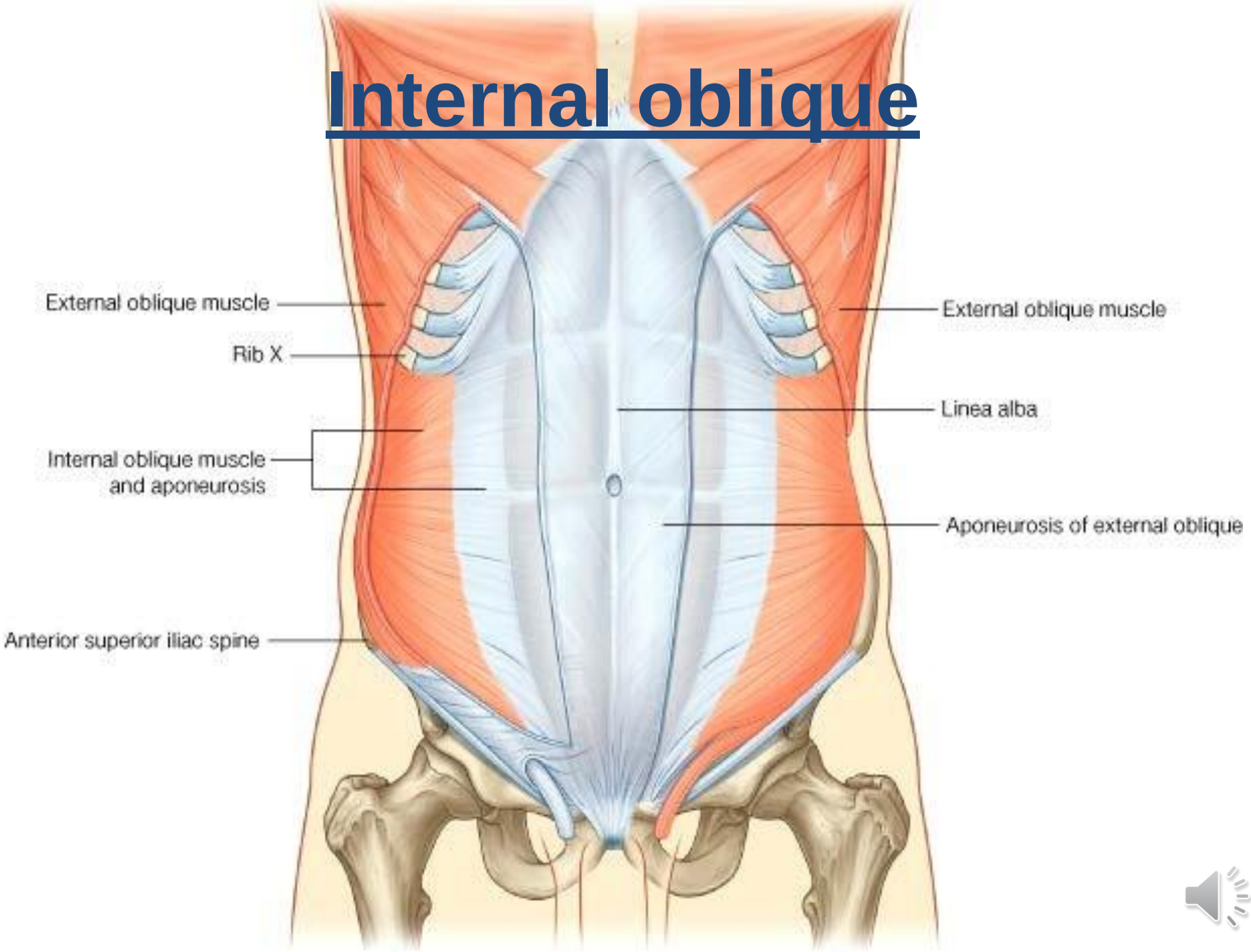
- There are **five muscles** in the anterolateral group of abdominal wall muscles:
- **three flat muscles** whose fibers begin posterolaterally, pass anteriorly, and are replaced by an aponeurosis as the muscle continues towards the midline the **external oblique, internal oblique**, and **transversus abdominis** muscles;
- **two vertical muscles**, near the midline, which are enclosed within a tendinous sheath formed by the aponeuroses of the flat muscles.

External oblique

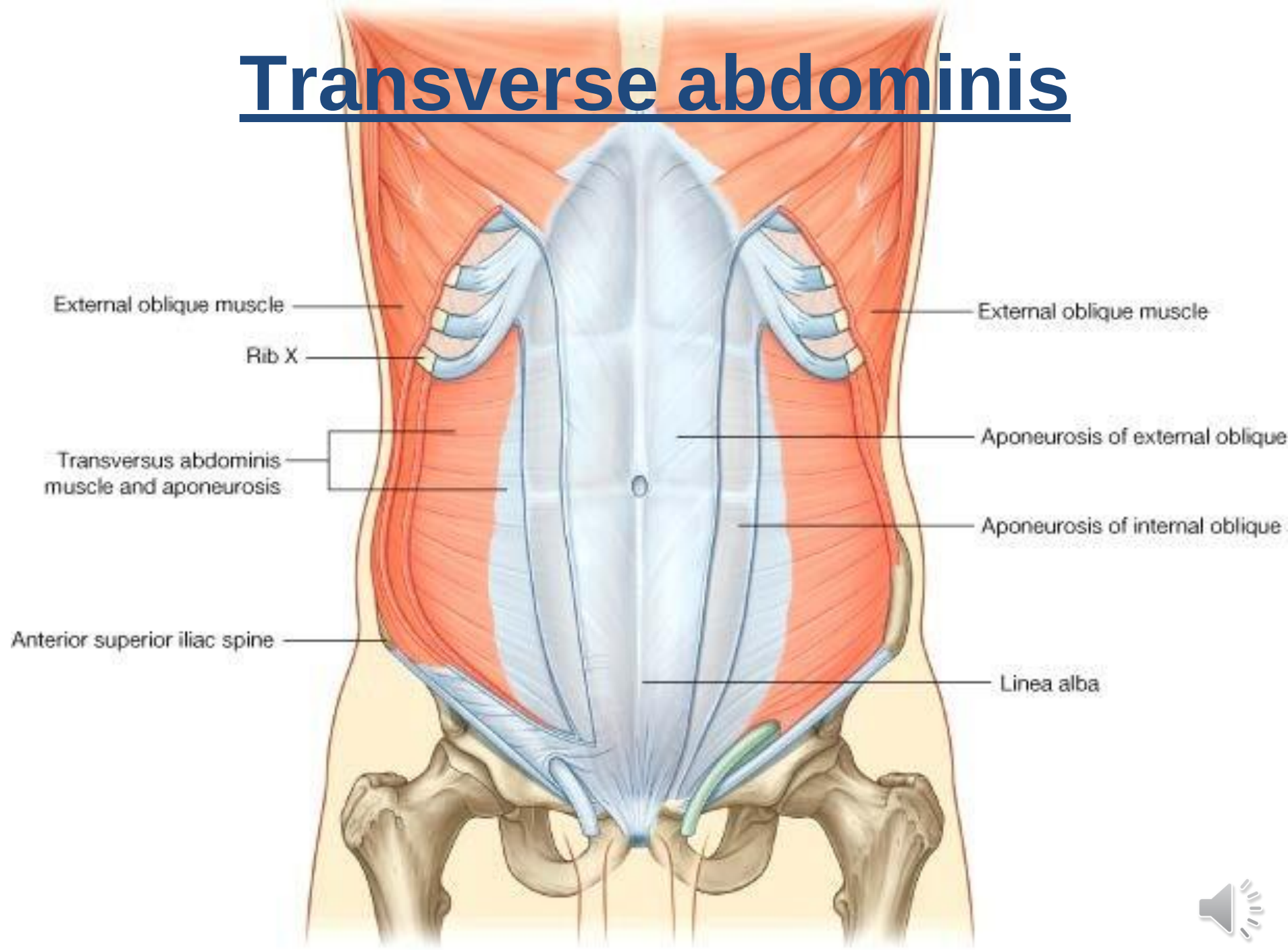



3)
7
8
9
10
ut)
External oblique (cut)
Transverse abdominal
Inguinal ligament
Internal oblique
Attachment of external oblique (cut) to iliac crest
(C)
(D)
External oblique
Internal oblique
Rectus sheath (anterici layer)
Inguinal ligament

Internal oblique



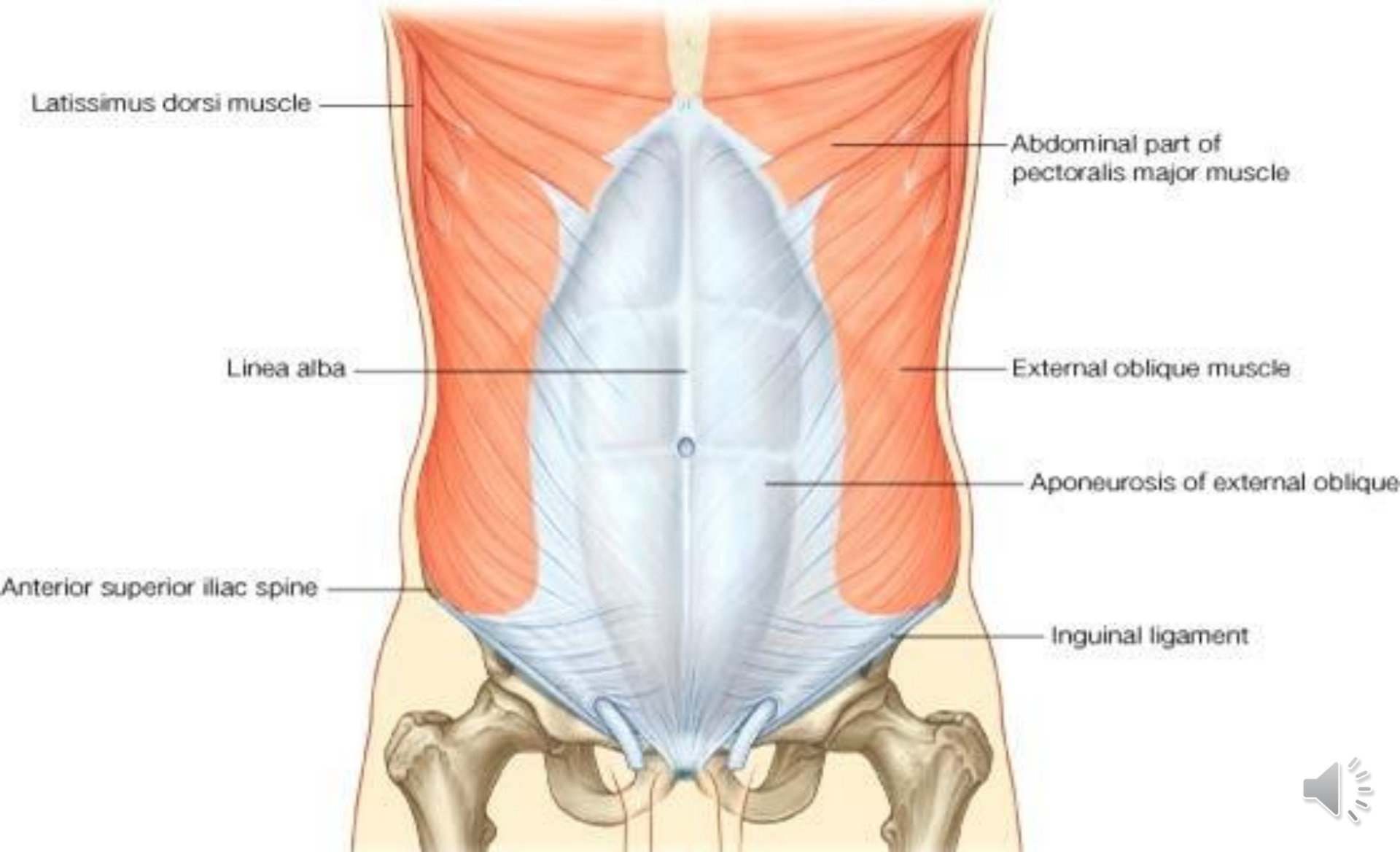
Transverse abdominis

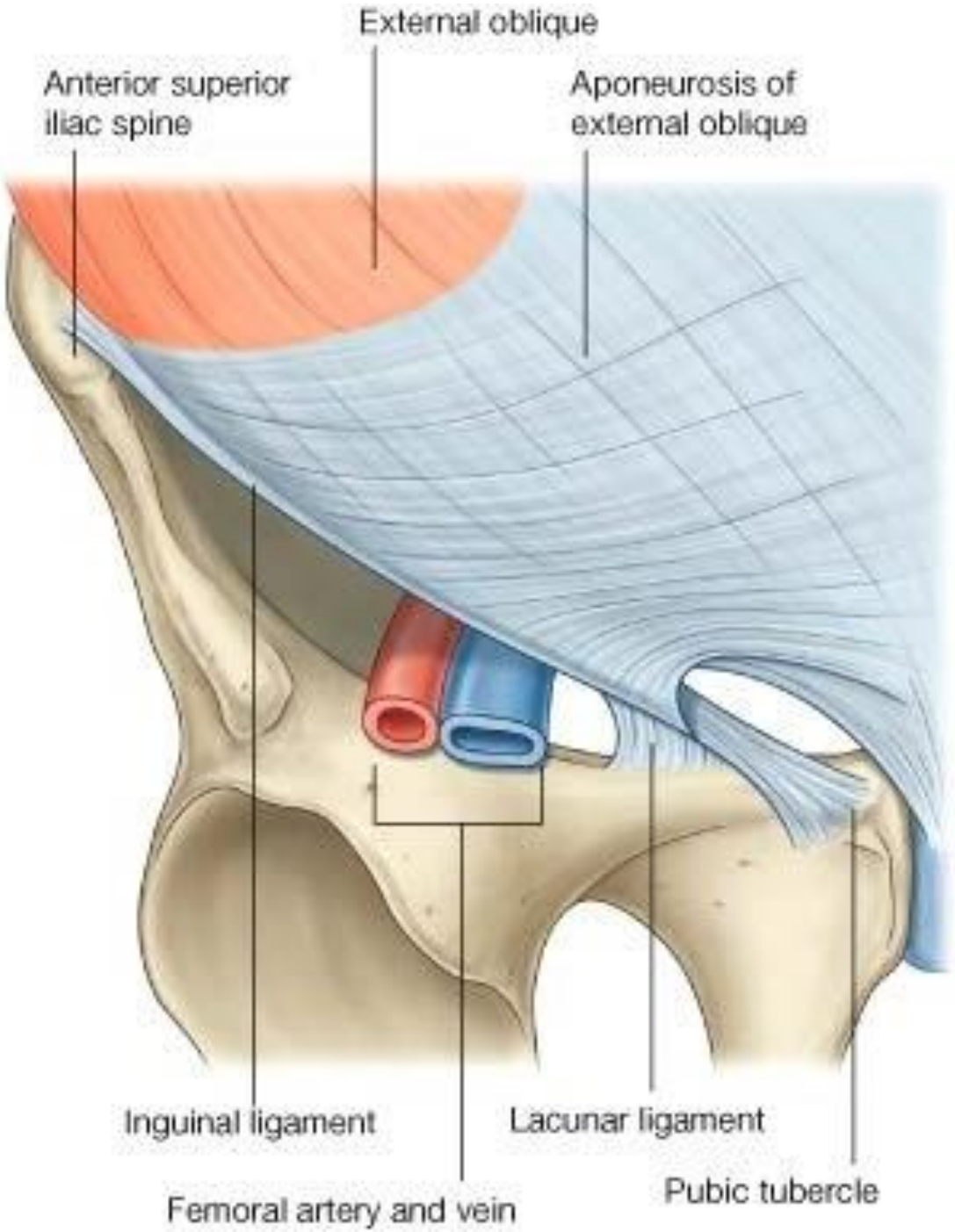


External oblique

Origin	Insertion	Innervation	Function
Muscular slips from the outer surfaces of the lower eight ribs (ribs 5-12)	Lateral lip of iliac crest; aponeurosis ending in midline raphe (linea alba)	Anterior rami of lower six thoracic spinal nerves (T7 to T12)	Compress abdominal contents; both muscles flex trunk; each muscle bends trunk to same side, turning anterior part of abdomen to opposite side

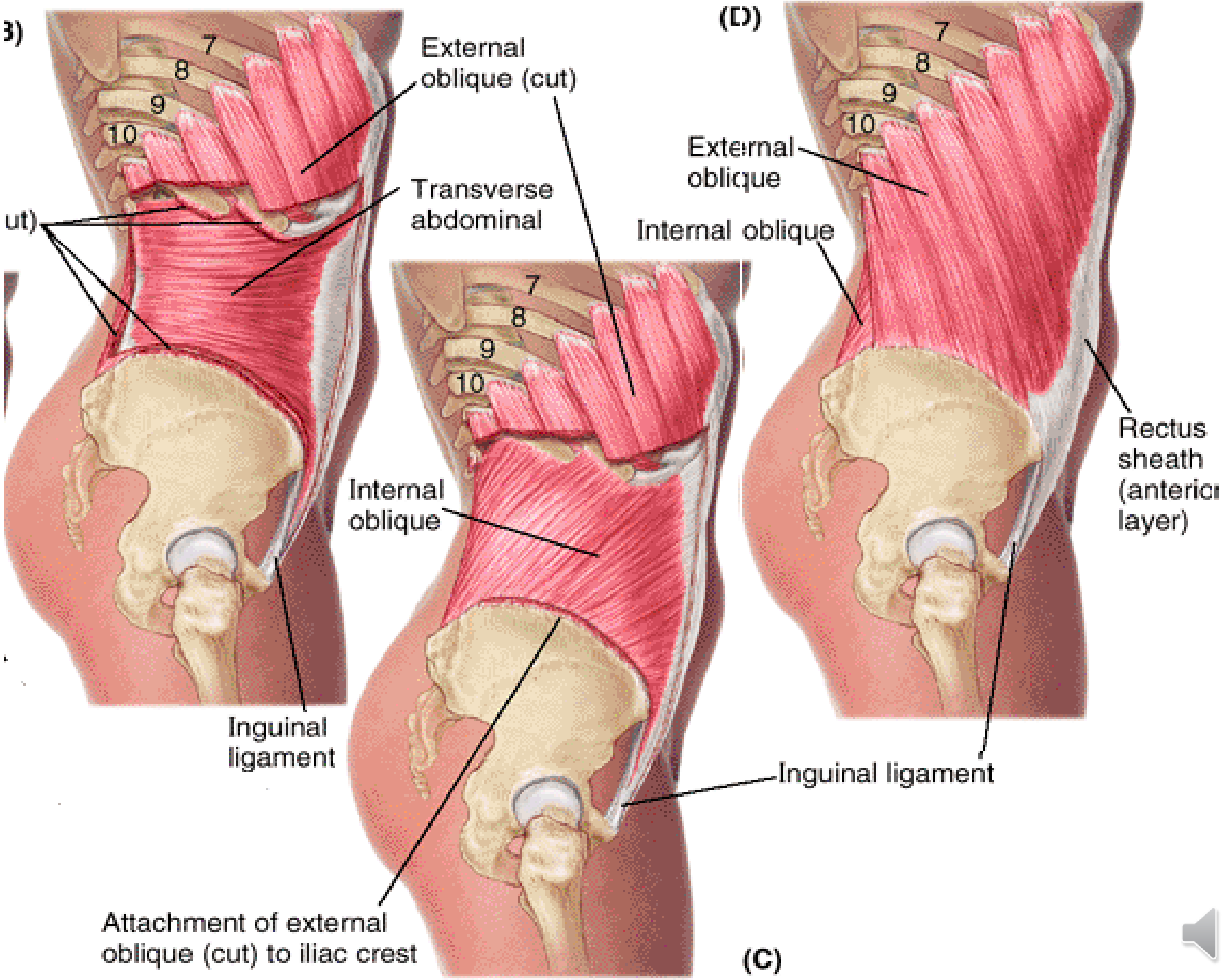
External oblique




External oblique
Anterior superior iliac spine
Aponeurosis of external oblique
Inguinal ligament
Lacunar ligament
Femoral artery and vein
Pubic tubercle

Internal oblique

Origin	Insertion	Innervation	Function
Thoracolumbar fascia; iliac crest between origins of external and transversus; lateral two-thirds of inguinal ligament	Inferior border of the lower three or four ribs; aponeurosis ending in linea alba; pubic crest and pectineal line	Anterior rami of lower six thoracic spinal nerves (T7 to T12) and L1	As External Oblique


3)
7
8
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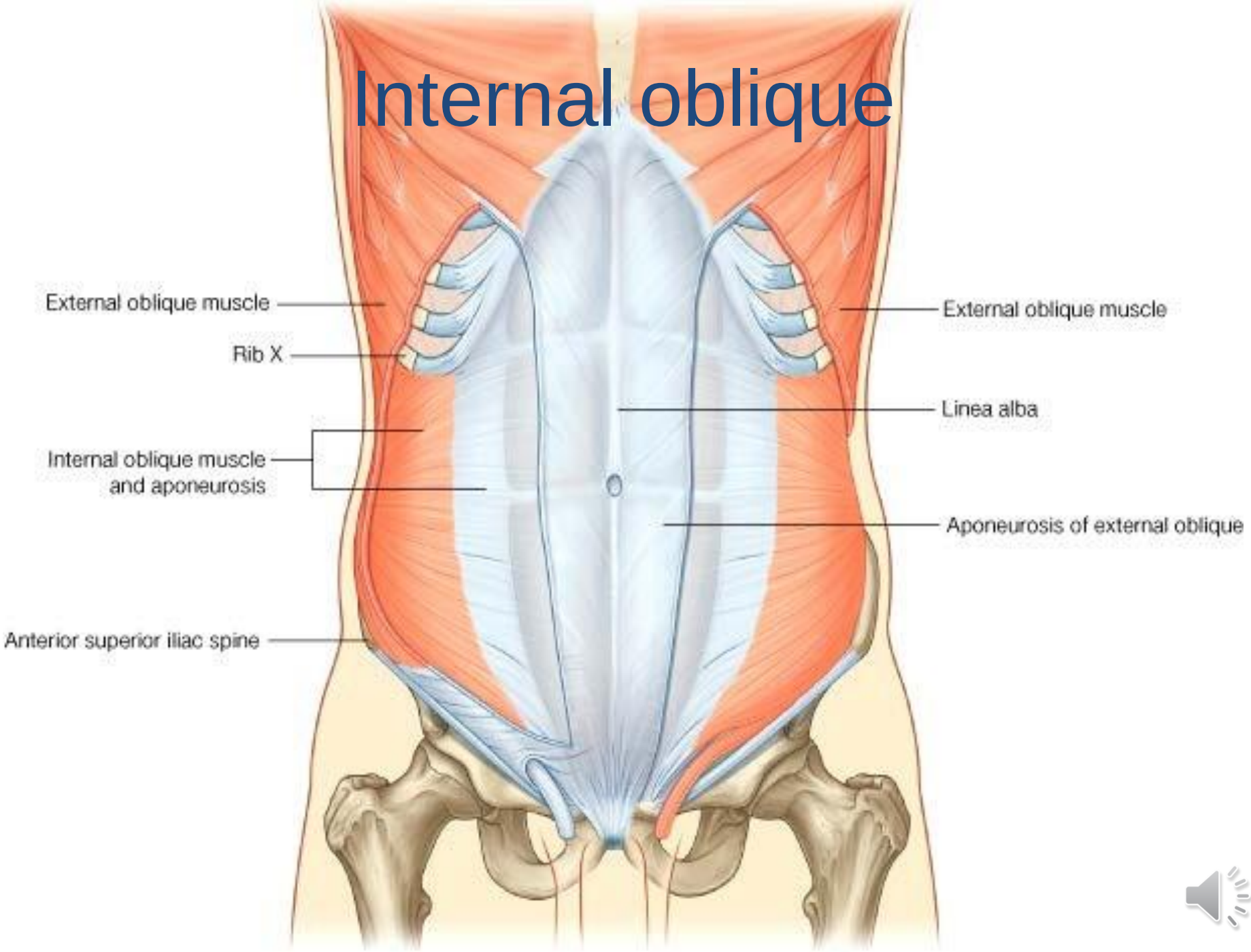
10
ut)
External oblique (cut)
Transverse abdominal
Inguinal ligament
Internal oblique
Attachment of external oblique (cut) to iliac crest
(C)
(D)
External oblique
Internal oblique
Rectus sheath (anterici layer)
Inguinal ligament

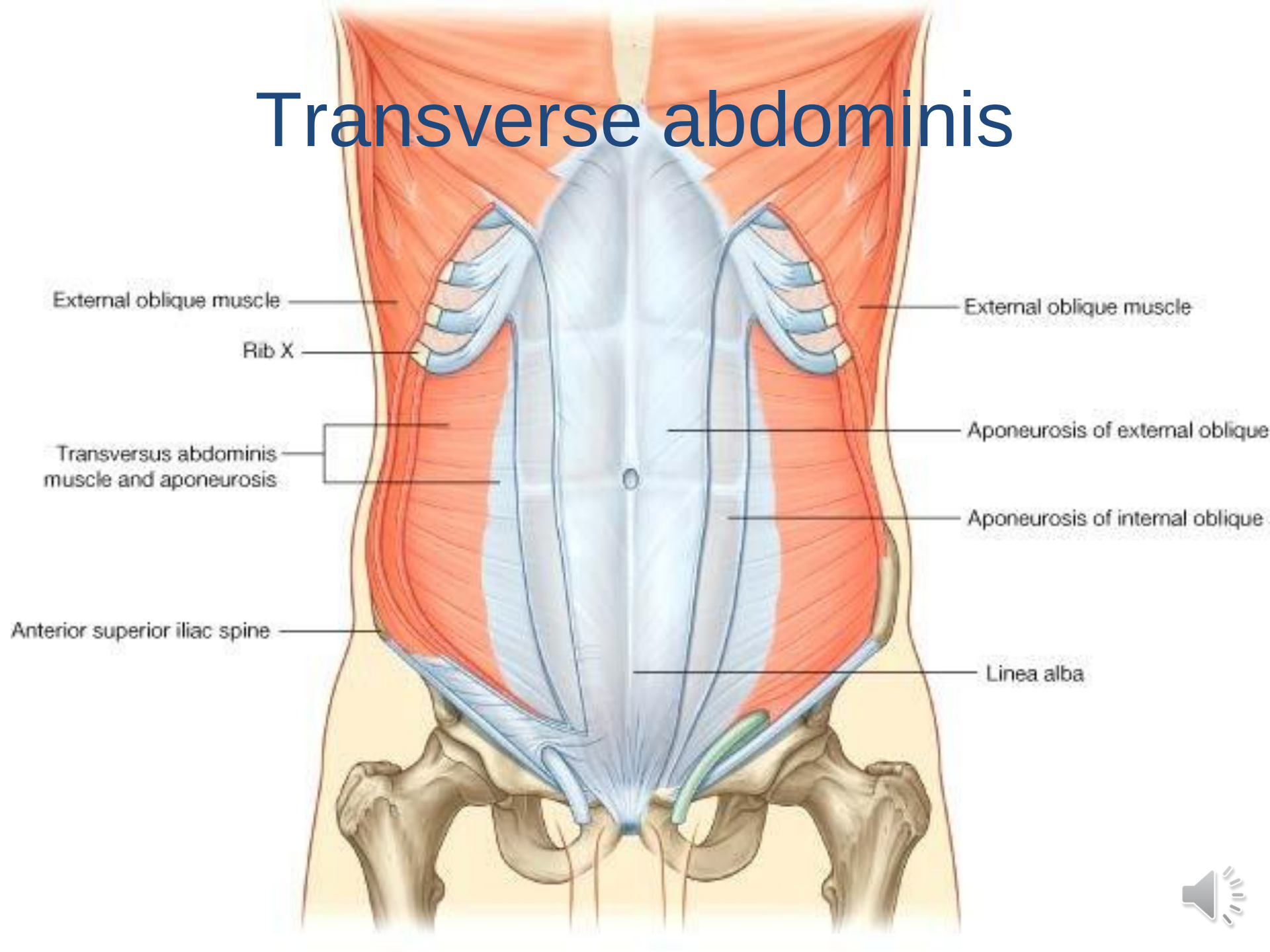
Internal oblique

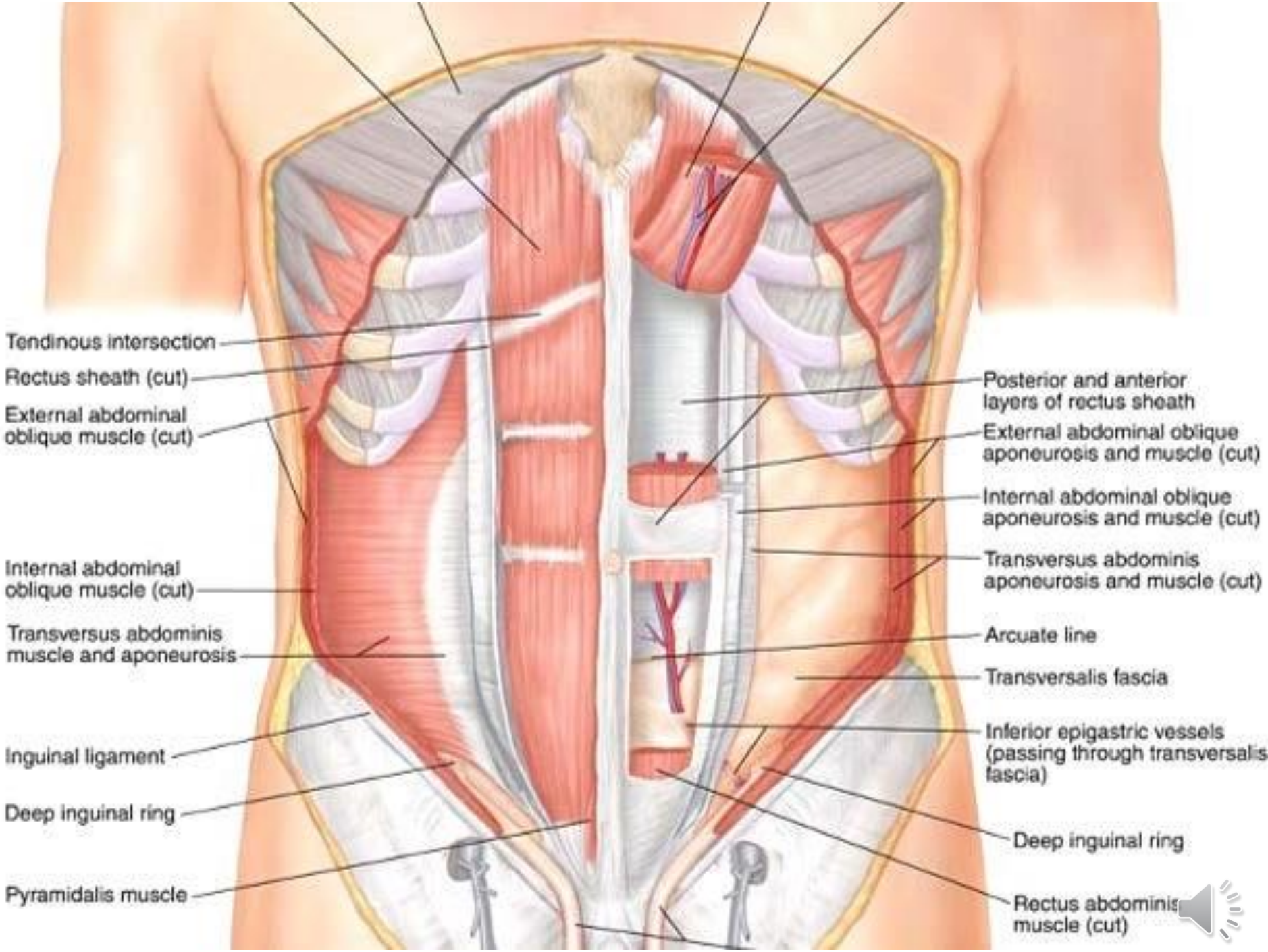


Transverse abdominis

Origin	Insertion	Innervation	Function
Thoracolumbar fascia; medial lip of iliac crest; lateral one-third of inguinal ligament; costal cartilages lower six ribs (ribs 7-12)	Aponeurosis ending in linea alba; pubic crest and pectineal line	Anterior rami of lower six thoracic spinal nerves (T7 to T12) and L1	Compress abdominal contents

Transverse abdominis



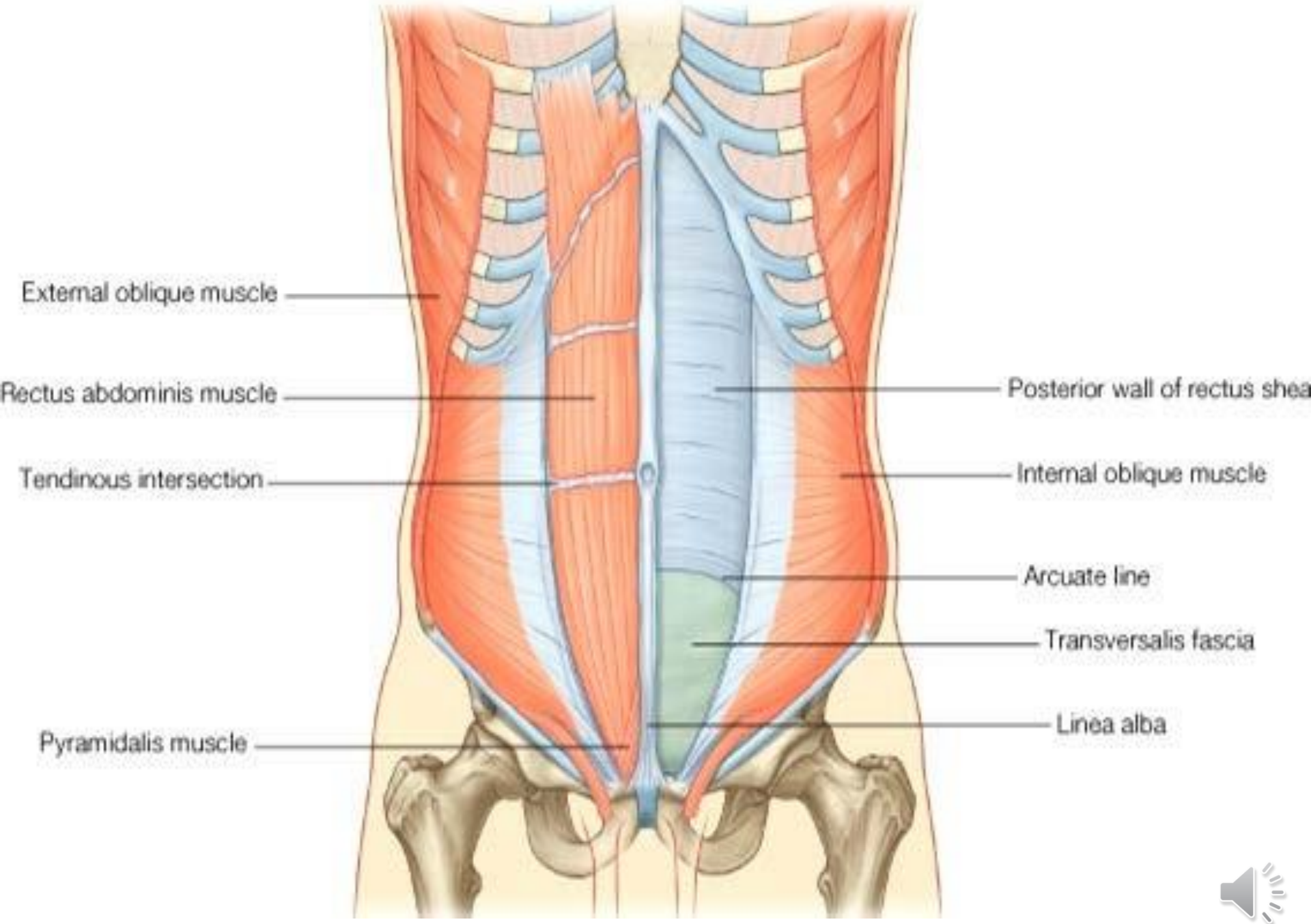

Tendinous intersection
Rectus sheath (cut)
External abdominal oblique muscle (cut)
Internal abdominal oblique muscle (cut)
Transversus abdominis muscle and aponeurosis
Inguinal ligament
Deep inguinal ring
Pyramidalis muscle
Posterior and anterior layers of rectus sheath
External abdominal oblique aponeurosis and muscle (cut)
Internal abdominal oblique aponeurosis and muscle (cut)
Transversus abdominis aponeurosis and muscle (cut)
Arcuate line
Transversalis fascia
Inferior epigastric vessels (passing through transversalis fascia)
Deep inguinal ring
Rectus abdominis muscle (cut)

Vertical muscles

- **The two vertical muscles in the anterolateral group of abdominal wall muscles are the large rectus abdominis and the small pyramidalis.**

Rectus abdominis

Origin	Insertion	Innervation	Function
Pubic crest, pubic tubercle, and pubic symphysis	Costal cartilages of ribs 5-7; xiphoid process	Anterior rami of lower seven thoracic spinal nerves (T7 to T12)	Compress abdominal contents; flex vertebral column; tense abdominal wall


External oblique muscle
Rectus abdominis muscle
Tendinous intersection
Pyramidalis muscle
Posterior wall of rectus shea
Internal oblique muscle
Arcuate line
Transversalis fascia
Linea alba

Pyramidalis

Origin	Insertion	Innervation	Function
Front of pubis and pubic symphysis	Into linea alba	Anterior ramus of T12	Tenses the linea alba

Rectus sheath

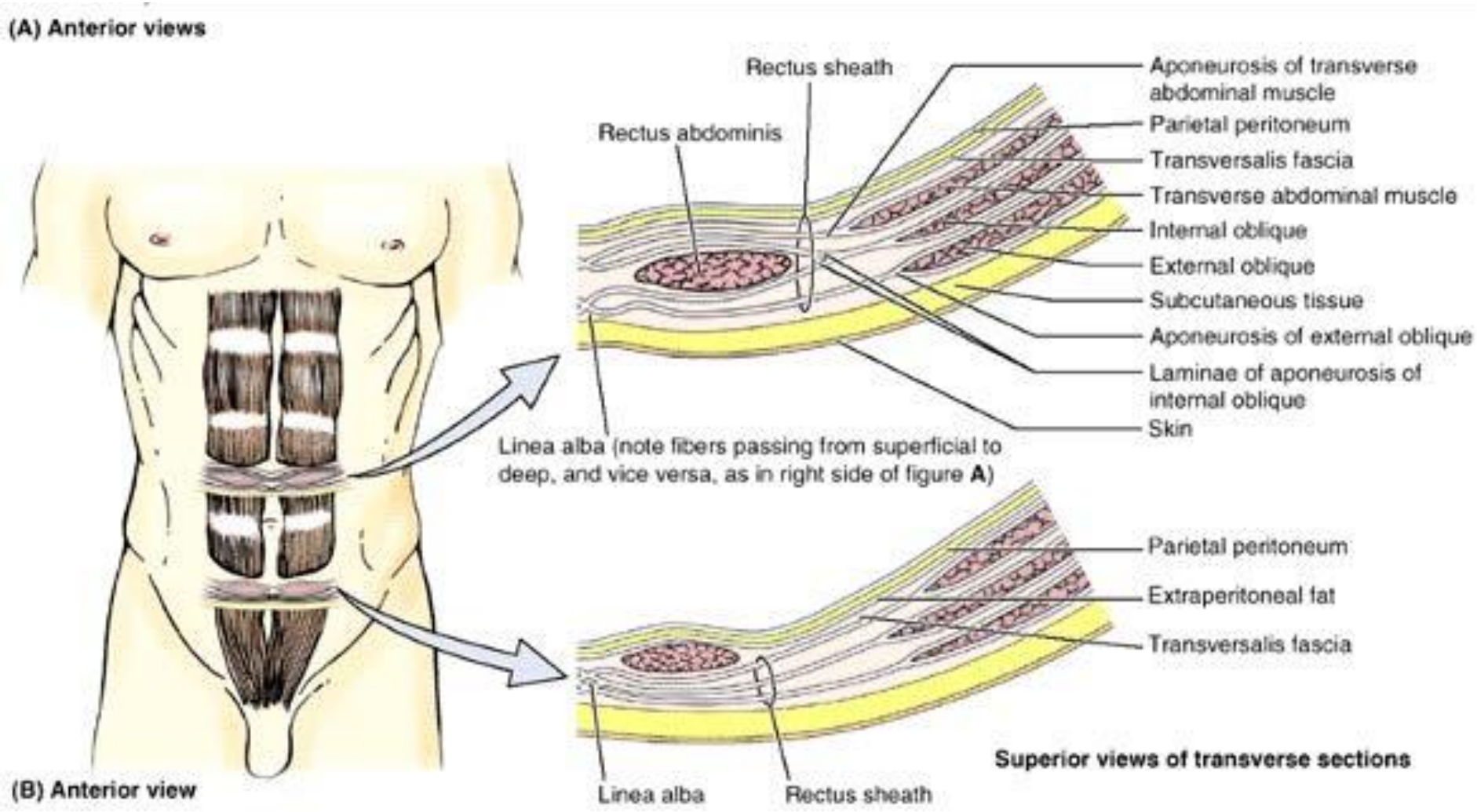
Rectus abdominis and pyramidalis muscles are enclosed in an aponeurotic tendinous sheath (rectus sheath) formed by a unique layering of the aponeuroses of the external and internal oblique, and transversus abdominis muscles.

Pattern of formation of rectus sheath:

1- Anterior wall consists of the aponeurosis of the external oblique and half of the aponeurosis of the internal oblique, which splits at lateral margin of rectus abdominis;

2- Posterior wall of the rectus sheath consists of the other half of the aponeurosis of the internal oblique and the aponeurosis of the transversus abdominis.

3- At a point midway between the umbilicus and the pubic symphysis all of the aponeuroses move anterior to the rectus muscle. There is no posterior wall of the rectus sheath and the anterior wall of the sheath consists of the aponeuroses of the external oblique, the internal oblique, and the transversus abdominis muscles.


(A) Anterior views
Rectus sheath
Aponeurosis of transverse abdominal muscle
Rectus abdominis
Parietal peritoneum
Transversalis fascia
Transverse abdominal muscle
Internal oblique
External oblique
Subcutaneous tissue
Aponeurosis of external oblique
Laminae of aponeurosis of internal oblique
Skin
Linea alba (note fibers passing from superficial to deep, and vice versa, as in right side of figure A)
Parietal peritoneum
Extraperitoneal fat
Transversalis fascia
Superior views of transverse sections
(B) Anterior view
Linea alba
Rectus sheath

Nerve supply of abdominal wall muscles

Lower 5 intercostal nerves and the subcostal nerve

7th - 11th intercostal nerves, after giving rise to lateral cutaneous branches, cross the costal margin posteriorly and continue on to supply abdominal skin and muscles. No longer being between ribs (intercostal),

The Digestive System

Two components:

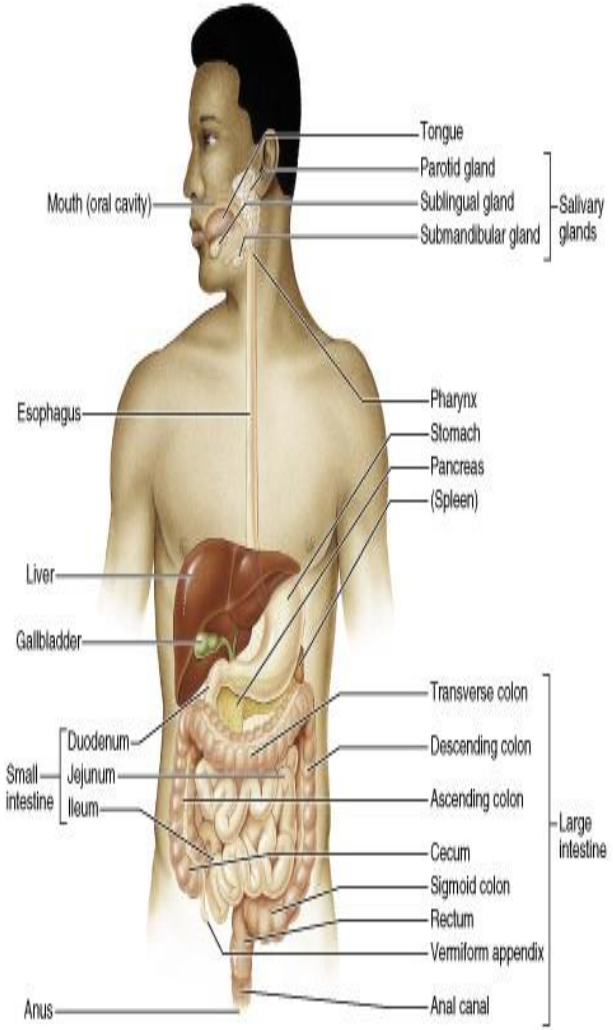
1- The Alimentary or Gastro-Intestinal Tract (G.I.T.) Starts by mouth cavity and ends in anus orifice.

2- Certain Accessory Glands:

A- Salivary glands in month cavity. B- liver, the largest gland in abdominal cavity. C- pancreas, exocrine and endocrine gland.

Differences between the small and large intestine

	Small intestine	Large intestine
Length	It is about long	It is about long
Caliber	Smaller	Larger
Mobility	Freely mobile	Less freely mobile
Teniae coli (3 bands of longitudinal muscles)	Absent	Present
Sacculations	Absent	Present
Appendices epiplica (fat)	Absent	Present over the free surface of the colon except the caecum, the appendix and the rectum
The mucous membrane	Has permanent folds, called plicae circulares	No plicae circulars
Villi in mucosa	Present	Absent
Peyer's patches (lymphatic aggregations)	Present	absent



Thoracic wall
&
Intercostal space

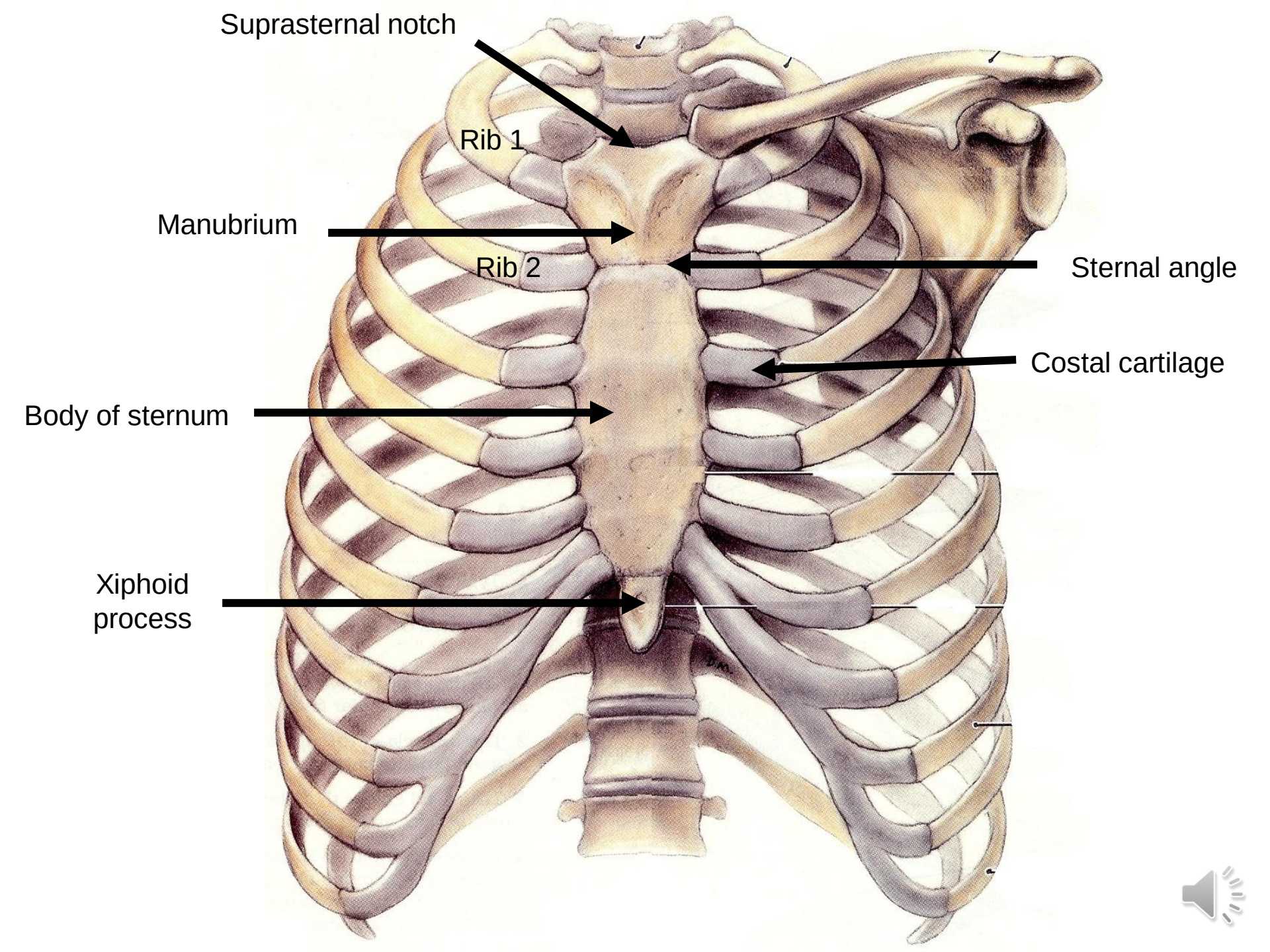
They lie between any 2 ribs:

11 spaces are seen from behind while only 9 spaces are seen anteriorly

each space contains:

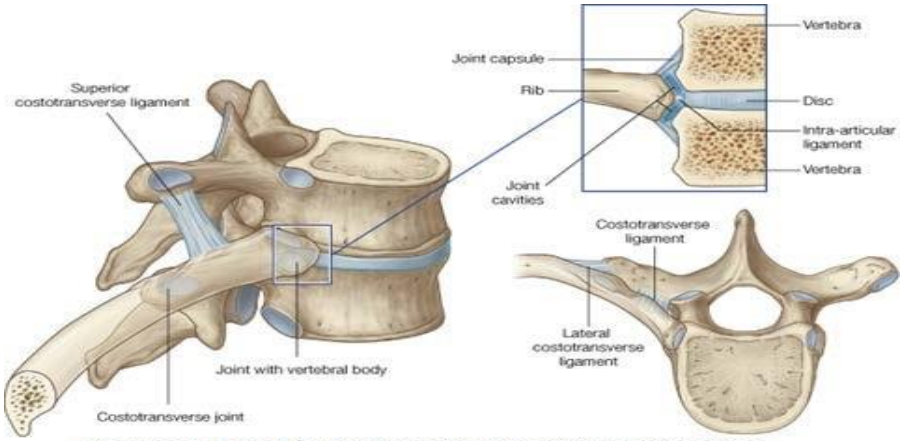
1- Three intercostal muscles

2- Intercostal nerves and vessels


Suprasternal notch
Rib 1
Manubrium
Rib 2
Sternal angle
Costal cartilage
Body of sternum
Xiphoid process

Joints of the thoracic wall

1- Vertebrae (intervertebral joints
2- Ribs and vertebrae,costovertebral joints
3-Ribs and costal cartilages (costochondral joints)
4-Costal cartilages, interchondral joints
5-Sternum and costal cartilages (sternocostal joints)
6-Parts of sternum (manubriosternal and xiphisternal joints)

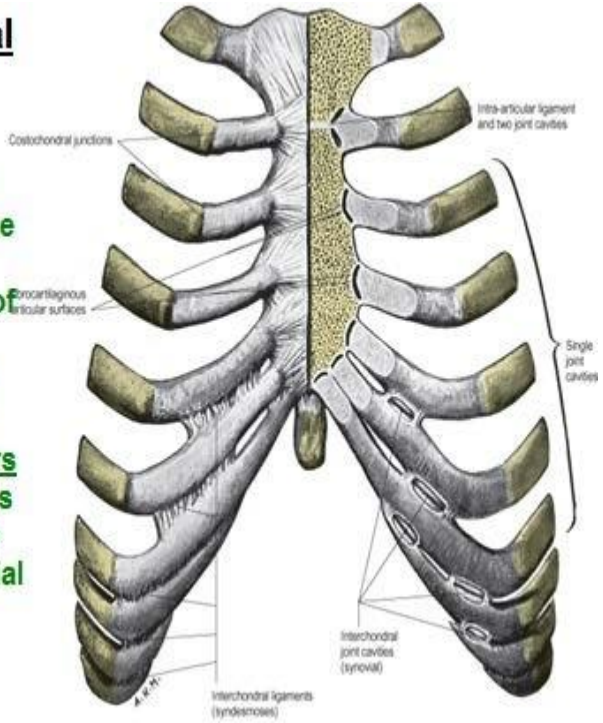


•The head of each typical rib articulates with demifacets or costal facets of two adjacent thoracic vertebrae and the IV disc between them

Sterno-costal joints:

The 1st pair of costal cartilages articulates with the manubrium by means of a layer of fibrocartilage (synchondrosis)

The 2nd - 7th pairs of costal cartilages articulate with the sternum at synovial joints



Joints of the sternum

The manubrio-sternal joint lies between the manubrium and sternal body, and is usually a symphysis

The xipho-sternal joint lies between the xiphoid process and the body of the sternum process is a symphysis

Thoracic wall & Intercostal space

They lie between any 2 ribs:

11 spaces are seen from behind while only 9 spaces are seen anteriorly

each space contains:

1- Three intercostal muscles

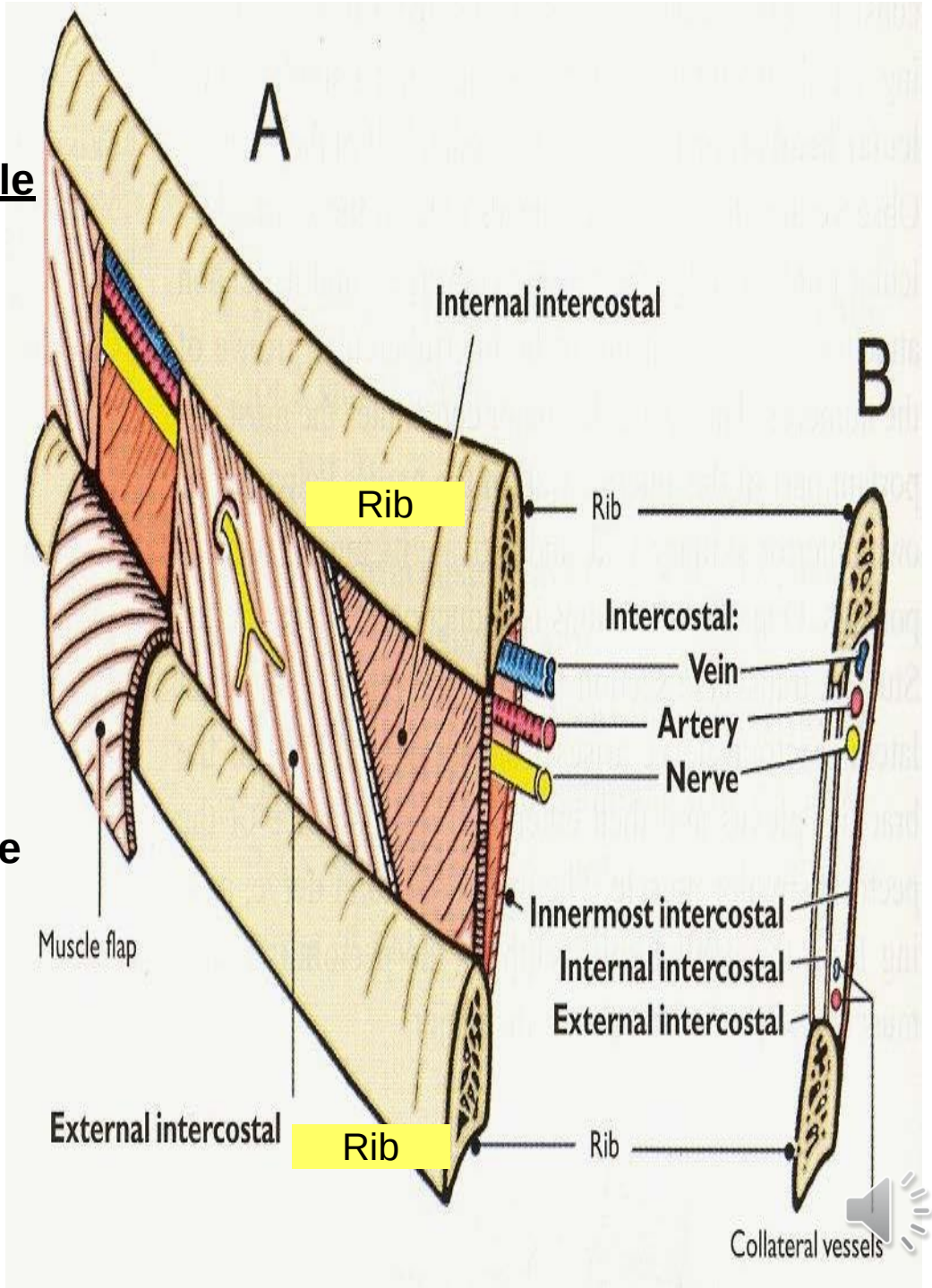
2- Intercostal nerves and vessels

The intercostal muscles

1- The superficial layer is formed by the external intercostal

2- The middle layer by the internal intercostal.

3- The deepest fibers of the latter, lying internal to the intercostal vessels are somewhat artificially designated as a separate muscle, the innermost intercostal.



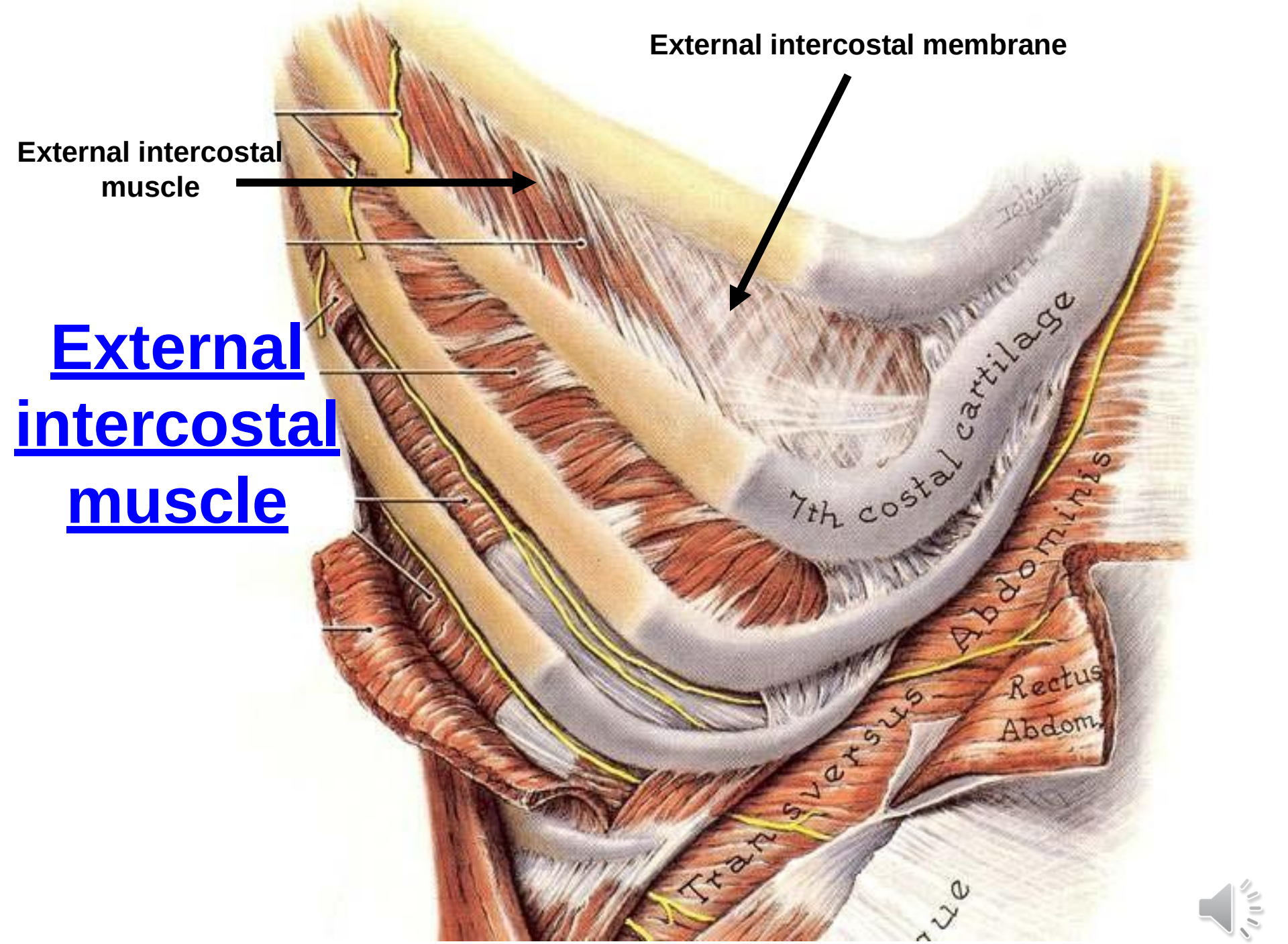
The intercostal muscles

The intercostal muscles occupy the intercostal spaces

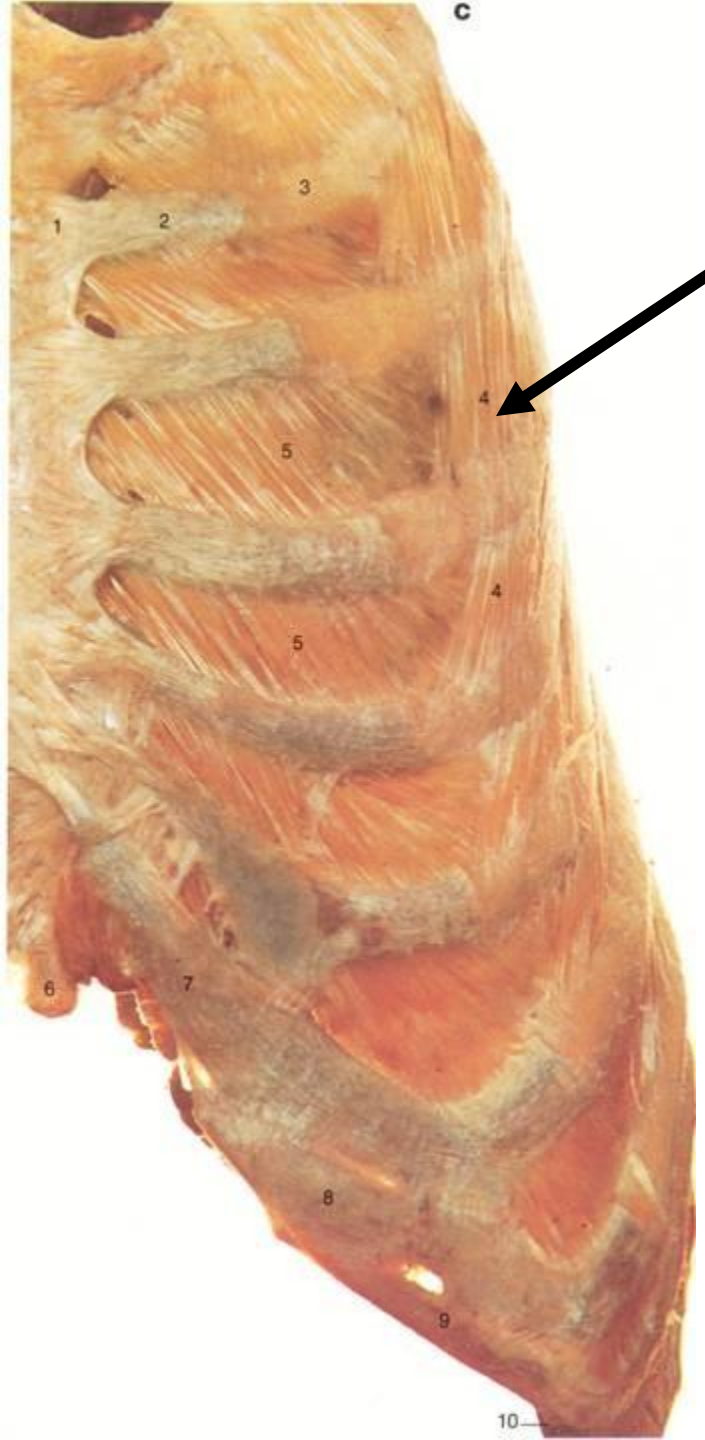
1- The superficial layer is formed by the external intercostal

2- The middle layer by the internal intercostal.

3- The deepest fibers of the latter, lying internal to the intercostal vessels are somewhat artificially designated as a separate muscle, the innermost intercostal.



External intercostal muscle



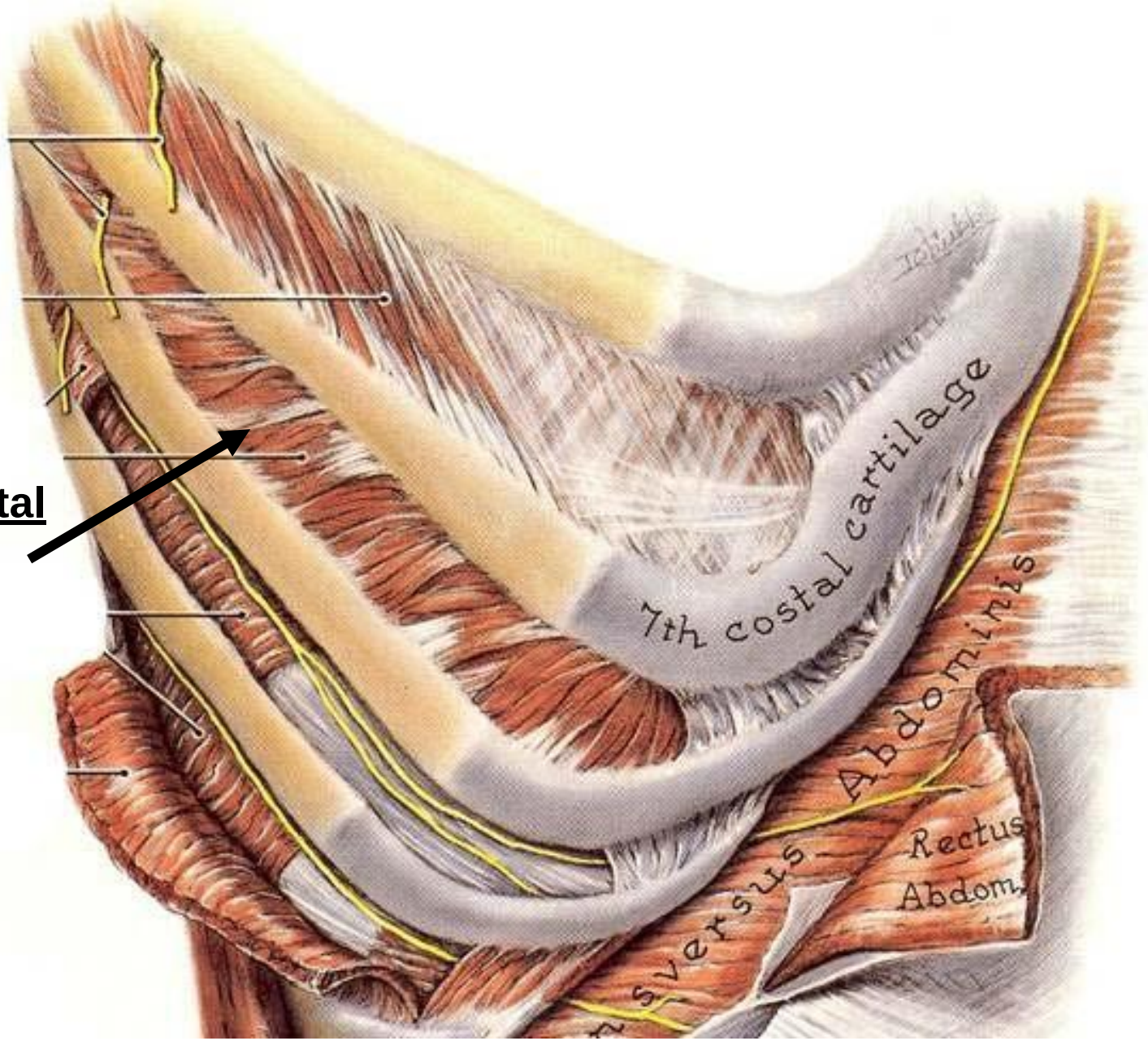
External intercostal muscle

Each muscle attaches superiorly to the inferior border of the rib above and inferiorly to the superior border of the rib below.

They occupy the intercostal spaces from the tubercles of the ribs posteriorly to the costochondral junctions anteriorly

Anteriorly, the muscle fibers are replaced by the external intercostal membranes

Internal intercostal muscle

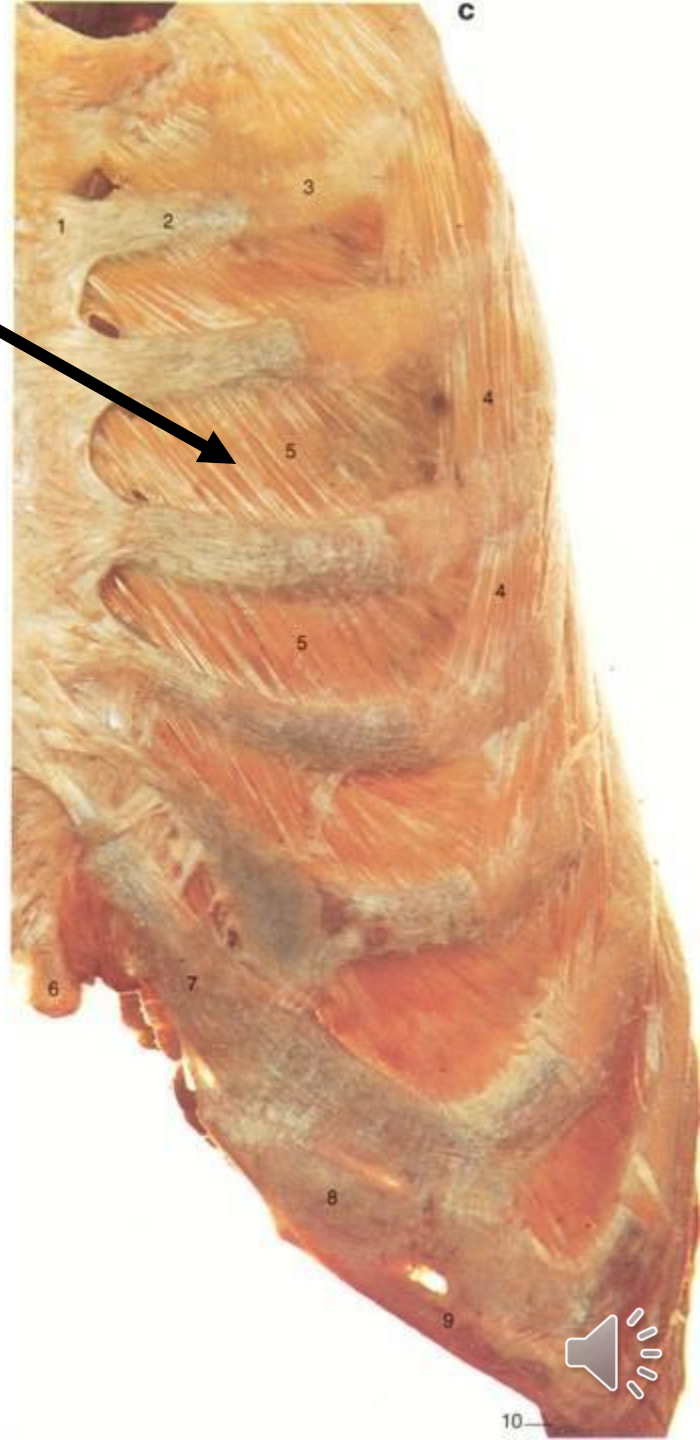


al intercostal muscle

Their fibers run infero-posteriorly from the floors of the costal grooves to the superior borders of the ribs inferior to them .

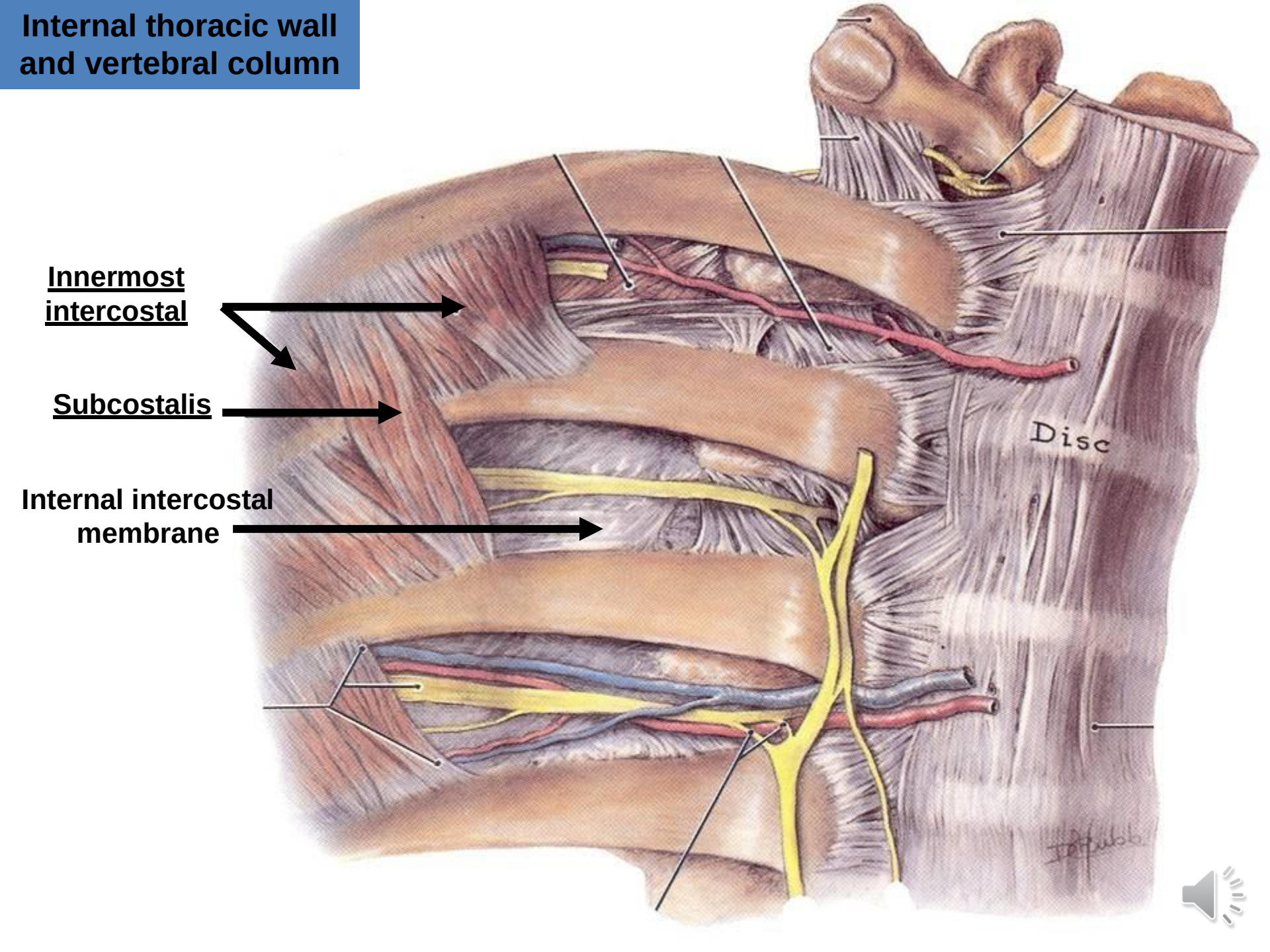
The internal intercostals attach to the bodies of the ribs and their costal cartilages as far anteriorly as the sternum and as far posteriorly as the angles of the ribs.

Between the ribs posteriorly, medial to the angles, the internal intercostals are replaced by the internal intercostal membranes



innermost intercostal muscles,
subcostal muscles *and*
transverse thoracis

Internal thoracic wall and vertebral column

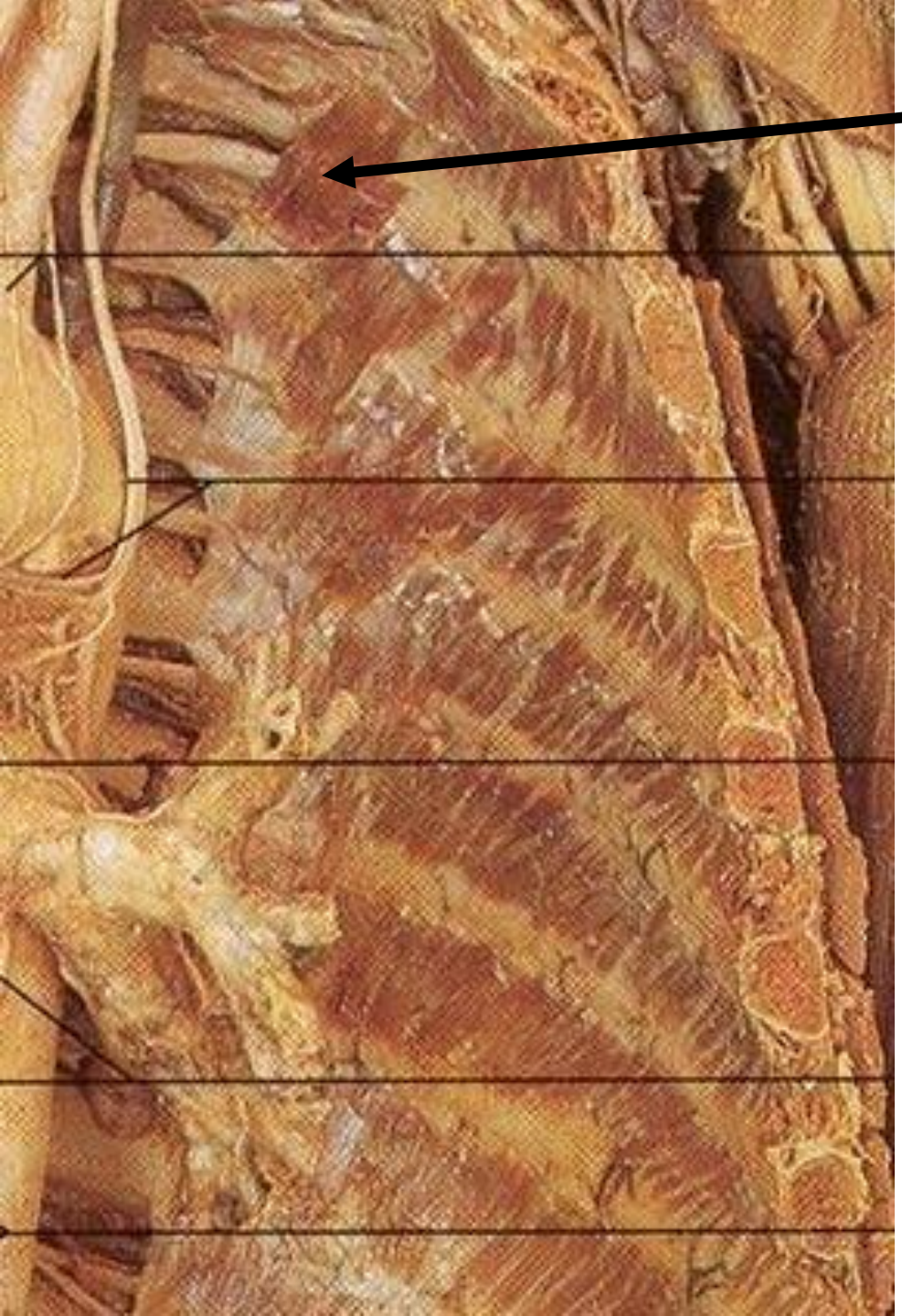


innermost intercostal muscle

The innermost intercostal muscles are similar to the internal intercostals and are essentially their deeper parts.

The innermost intercostals are separated from the internal intercostals by the intercostal nerves and vessels.

These muscles pass between the internal surfaces of adjacent ribs and occupy the lateralmost parts of the intercostal spaces. It is likely that their actions are the same as those of the internal intercostal muscles.



subcostal muscles

The subcostal muscles are variable in size and shape, usually being well developed only in the lower thoracic wall.

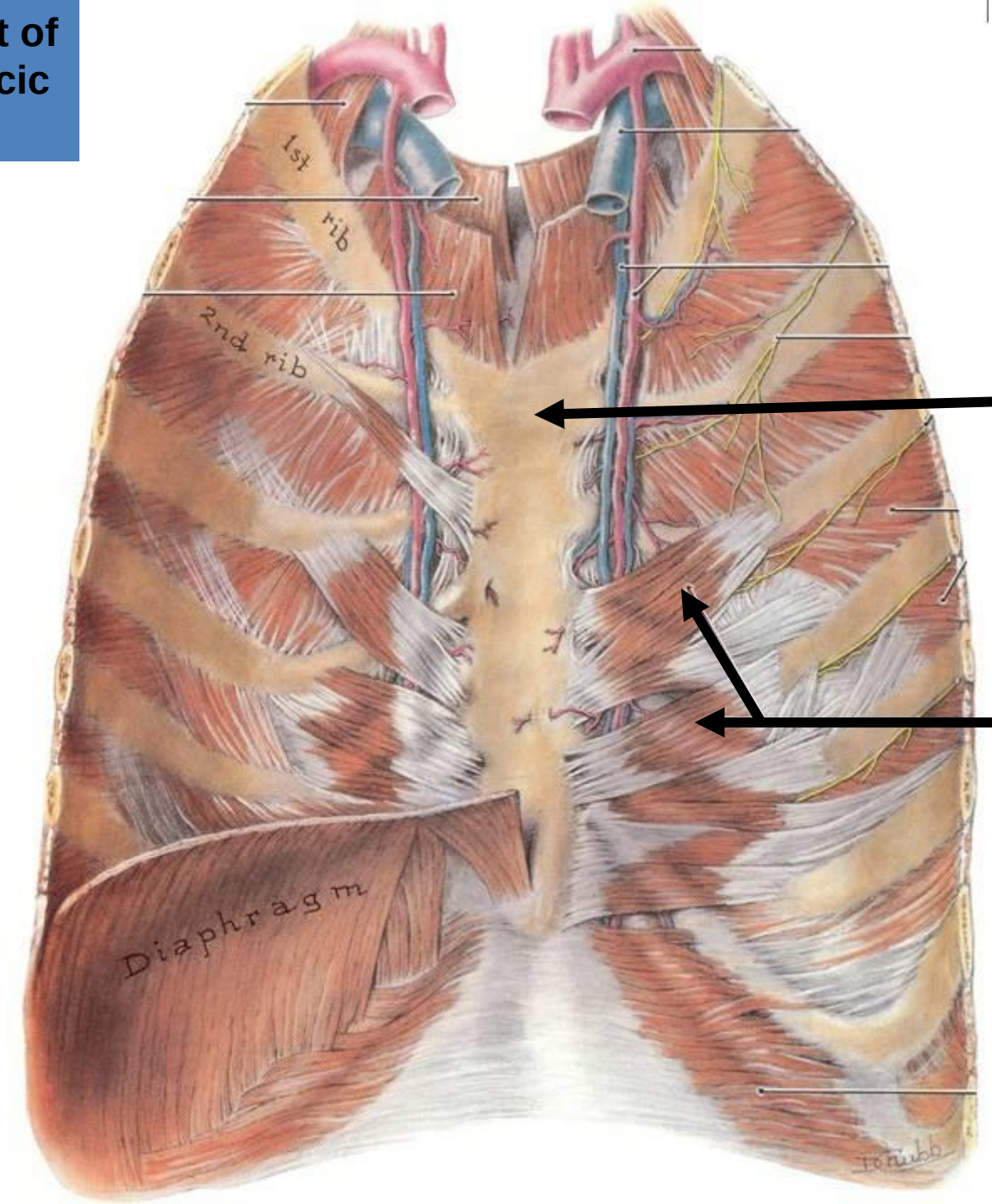
These thin muscular slips extend from the internal surface of the angle of one rib to the internal surface of the second or third rib inferior to it. Crossing one or two intercostal spaces, the subcostals run in the same direction as the internal intercostals and blend with them

Transversus thoracis

consist of four or five slips that attach posteriorly to the xiphoid process, the inferior part of the body of the sternum, and the adjacent costal cartilages.

They pass superolaterally and attach to the 2nd - 6th costal cartilages.

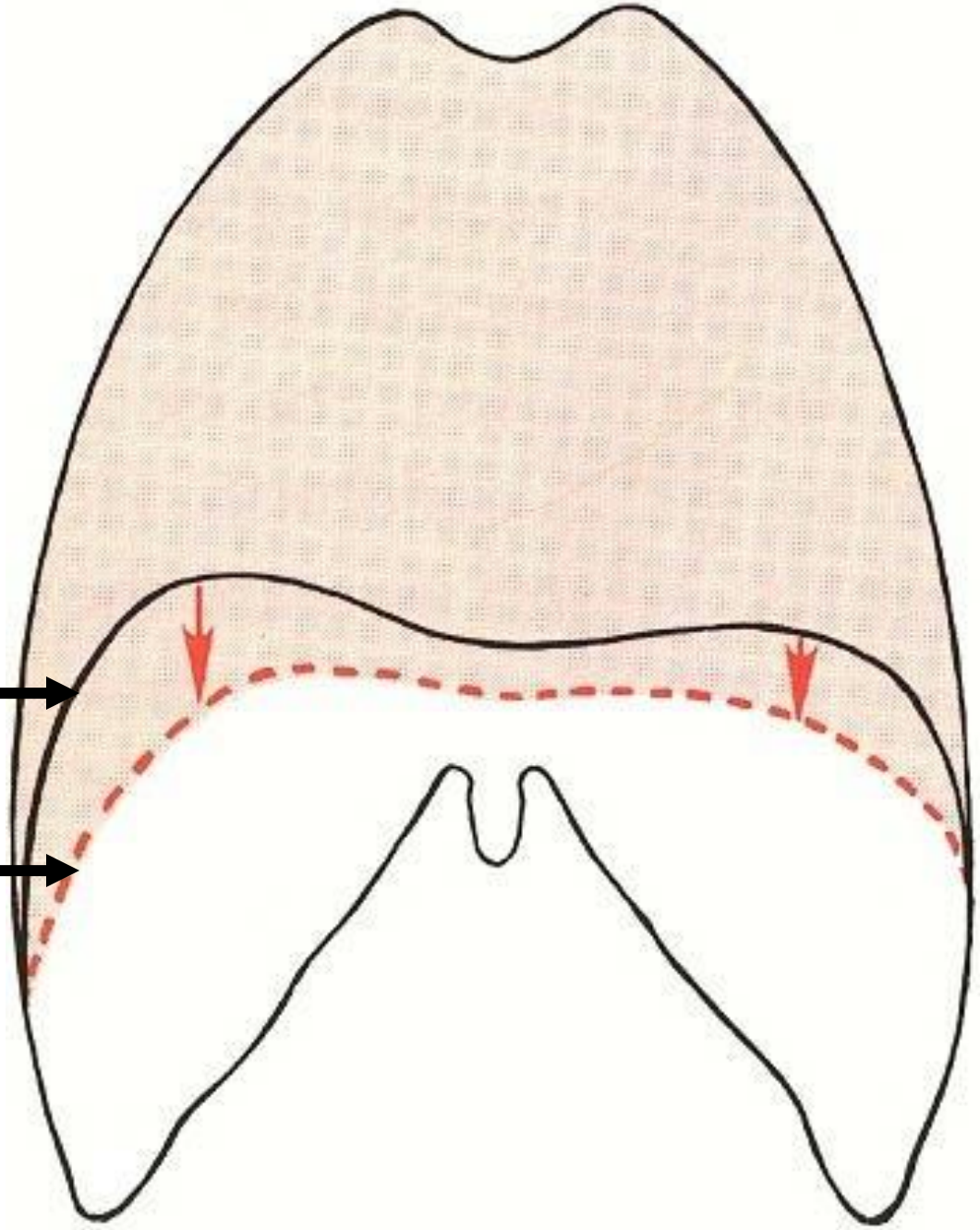
Internal aspect of anterior thoracic wall



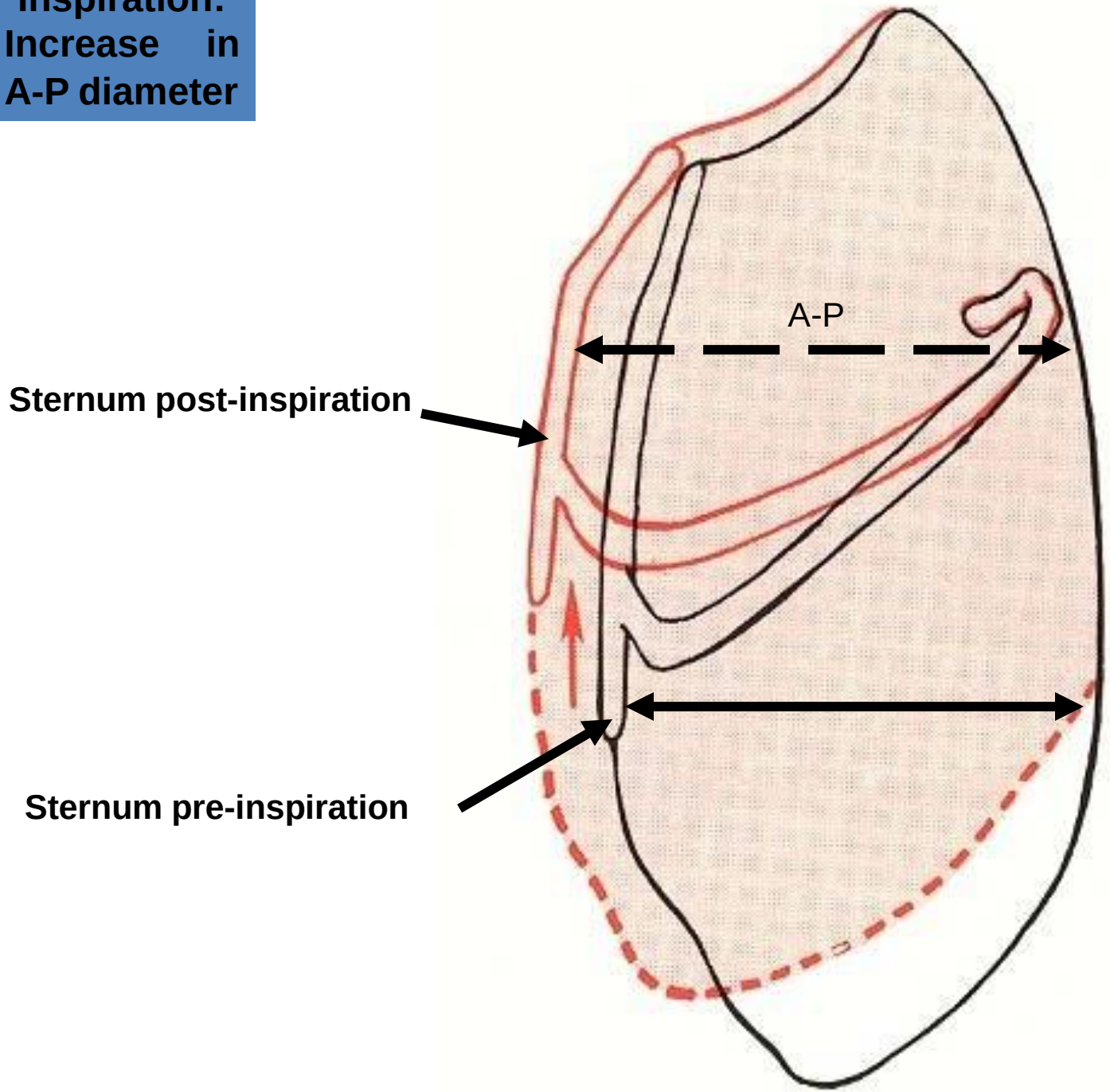
Action of intercostal muscles

(*respiratory movements*)

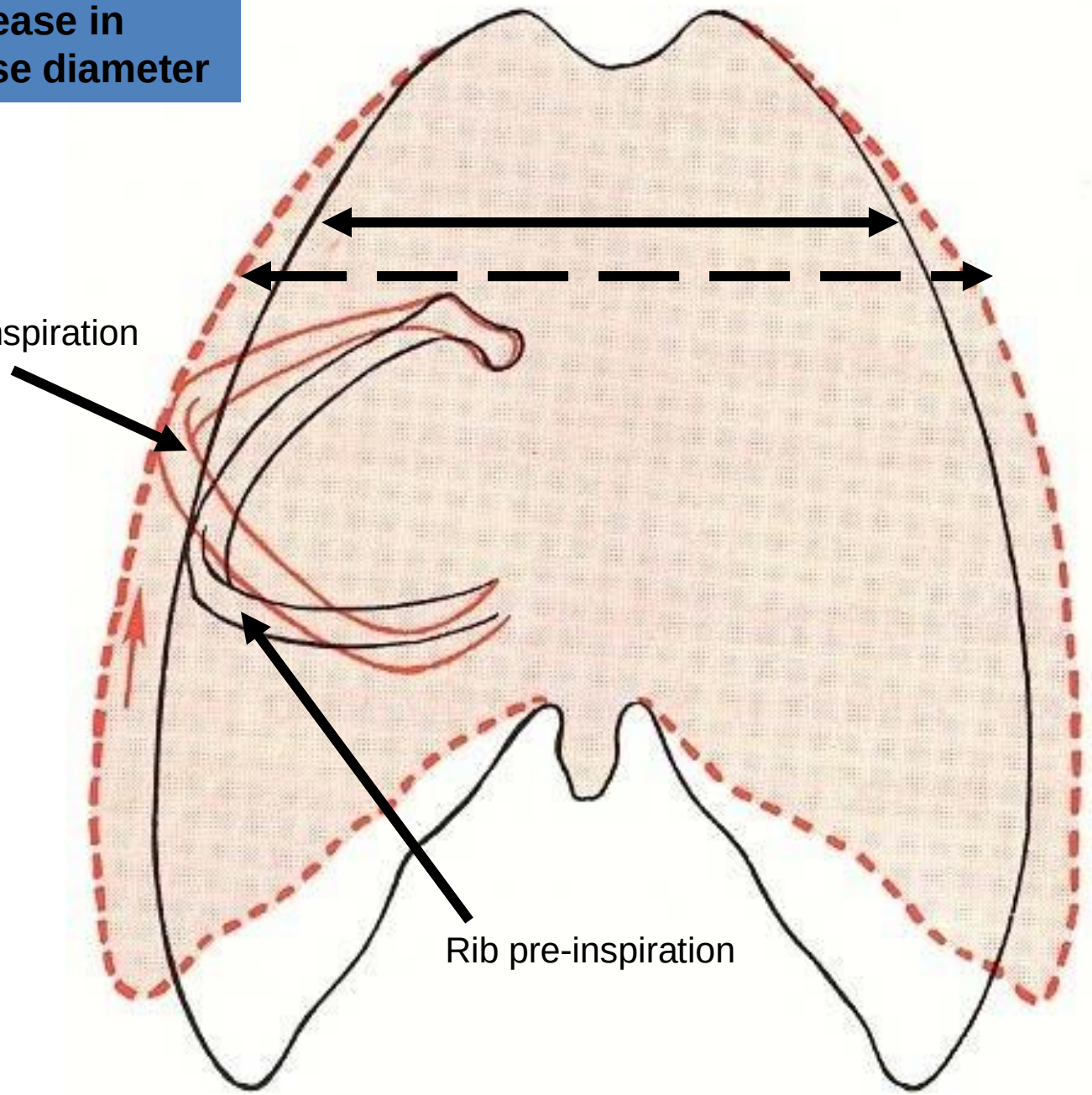
Inspiration: Increase in vertical diameter



Inspiration: Increase in A-P diameter



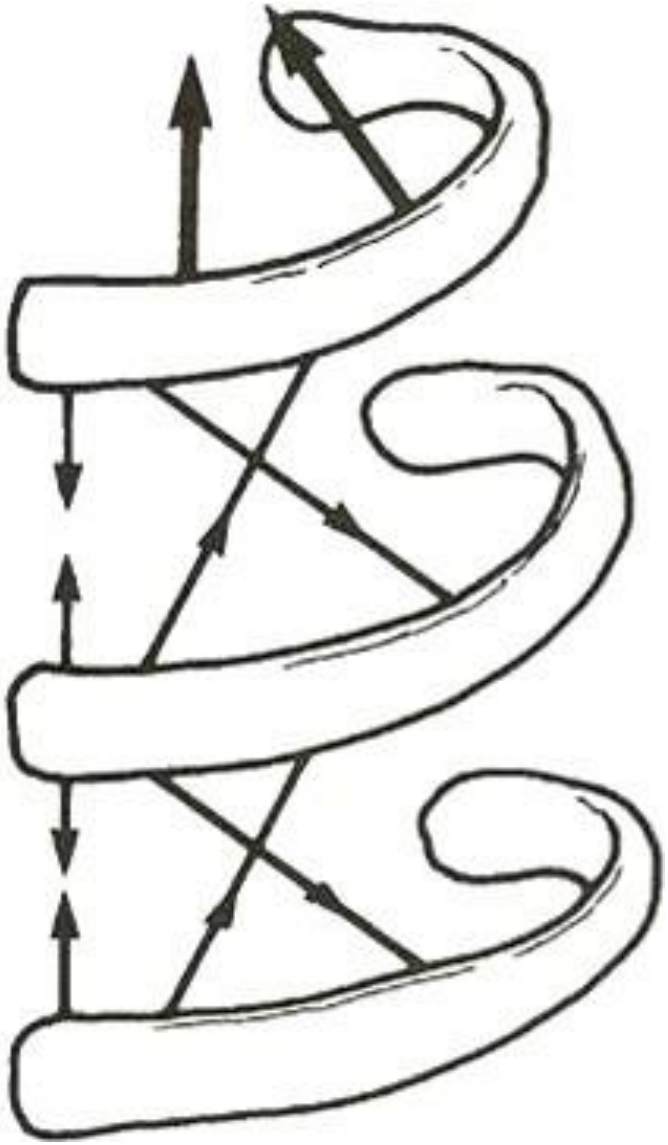
Inspiration : Increase in transverse diameter



Muscles of inspiration acting on ribs

Scalene muscles contract – draw 1st rib up and fixes it

Intercostals contract – draw ribs together



Nerves of the Thoracic Wall

12 pairs of thoracic spinal nerves supply thoracic wall.

- **As soon as they leave the IV foramina in which they are formed, the mixed thoracic spinal nerves divide into anterior and posterior primary rami.**
- **The anterior rami of nerves T1 - T11 form the intercostal nerves that run along the extent of the intercostal spaces. The anterior ramus of nerve T12, coursing inferior to the 12th rib, is the subcostal nerve**
- **The posterior rami of thoracic spinal nerves pass posteriorly to supply the joints, muscles, and skin of the back in the thoracic region**

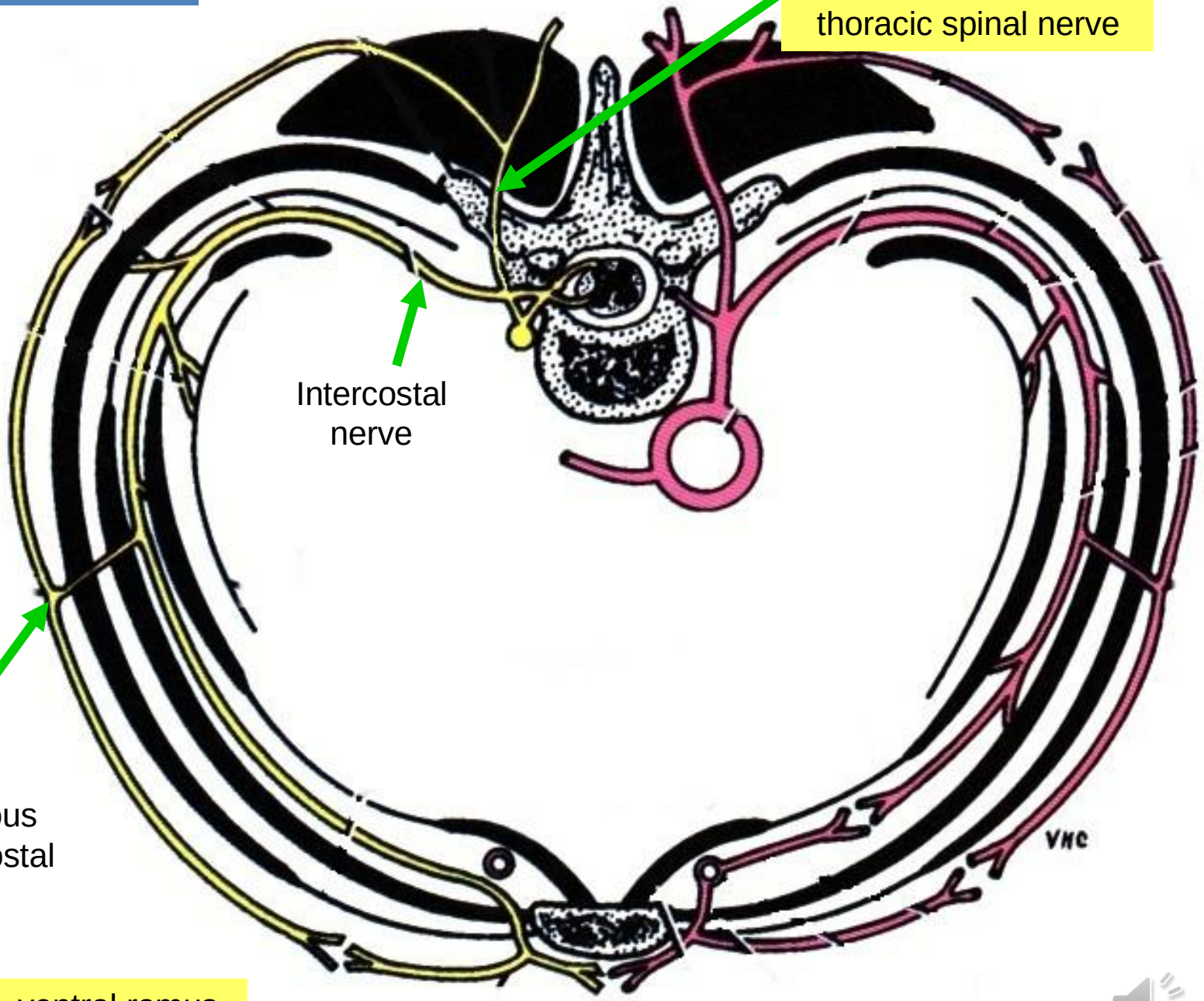
Typical Intercostal Nerves

The 3rd - 6th intercostal nerves

They enter the medial-most parts of posterior intercostal spaces, running initially within the endothoracic fascia between parietal pleura and internal intercostal membrane nearly in the middle of the intercostal spaces. Near angles of the ribs, the nerves pass between the internal intercostal and the innermost intercostal muscles. At this point, intercostal nerves pass to and then continue to course within the costal grooves ,running inferior to the intercostal arteries (which, in turn, run inferior to intercostal vein). The nerves continue anteriorly between the internal and the innermost intercostal muscles, giving branches to these and other muscles and giving rise to lateral cutaneous branches. Anteriorly, the nerves appear on internal surface of the internal intercostal muscle. Near sternum, the intercostal nerves turn anteriorly, passing between the costal cartilages to become anterior

.cutaneous branches.

Cross-section of thorax



Intercostal nerve=ventral ramus of thoracic spinal nerve

Atypical Intercostal Nerves

1st intercostal nerve has no anterior cutaneous branch but no lateral cutaneous branch

2nd intercostal nerve gives rise to a large lateral cutaneous branch, the inter-costo-brachial nerve; it emerges from the 2nd intercostal space, and enters the axilla and arm. The inter-costo-brachial nerve usually supplies the floor skin and subcutaneous tissue of the axilla.

7th - 11th intercostal nerves, after giving rise to lateral cutaneous branches, cross the costal margin posteriorly and continue on to supply abdominal skin and muscles. No longer being between ribs (intercostal),

Cardio-vascular System

(1) -The heart & pericardium. (2)Great vessels

The Heart

Site: In middle mediastinum between two lungs above central fibrous part of diaphragm separating it from stomch

Formation: 4 chambers: right & left atria and right & left vent.

Structure: The wall of heart has 3 layers :

1- Endocardium. 2- Myocardium. 3- Epicardium.

Shape: It is pyramidal in shape has:

1- **Apex of the heart** is directed downward and to the left. It is formed by the ventricle. Lies at left 5th inter-costal space 9 Cm. from midline.

2- **Base** is upward and to right formed by 2 atria lies opposite T.6-T.9

Borders of the heart are four:

a. **Right border** Formed by right atrium.

b. **Inferior border** Formed mainly by right ventricle and slightly by the left ventricle.

c. **Left border** Formed by left ventricle & slightly by left auricle.

d. **Superior border** Formed by right and left atria and auricles.

4- Surfaces of the heart are four:

Anterior (sterno-costal) surface: Formed by Rt. Ventricle (2\3) and Lt. Ventricle (1\3).

b. **Right pulmonary surface:** Formed mainly by Rt. atrium.**c. Left pulmonary surface:** Formed mainly by Lt.

d. **Inferior (diaphragmatic) surface:** Formed mainly by Lt. Ventricle (2\3) and Rt. Ventricle (1\3).

5- Valves of the heart are four valves:

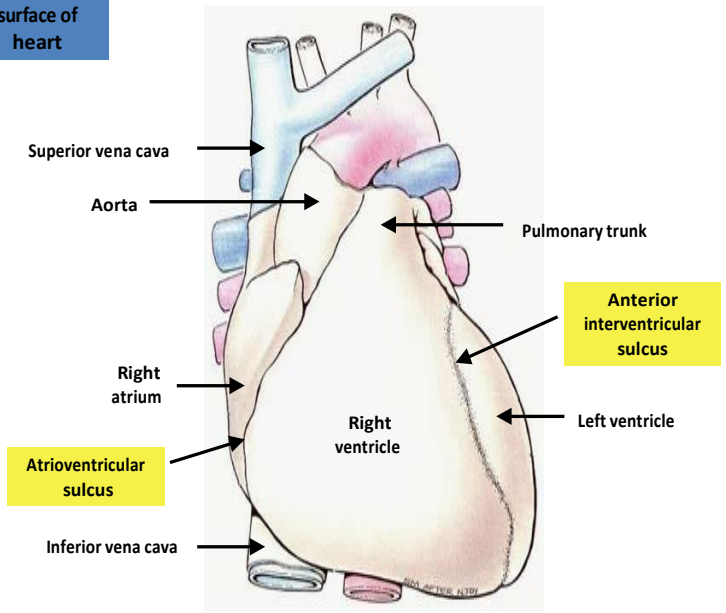
a. Tricuspid valve between Rt. atrium & Rt. Ventricle.

b. Mitral valve between Lt. atrium & Lt. ventricle.

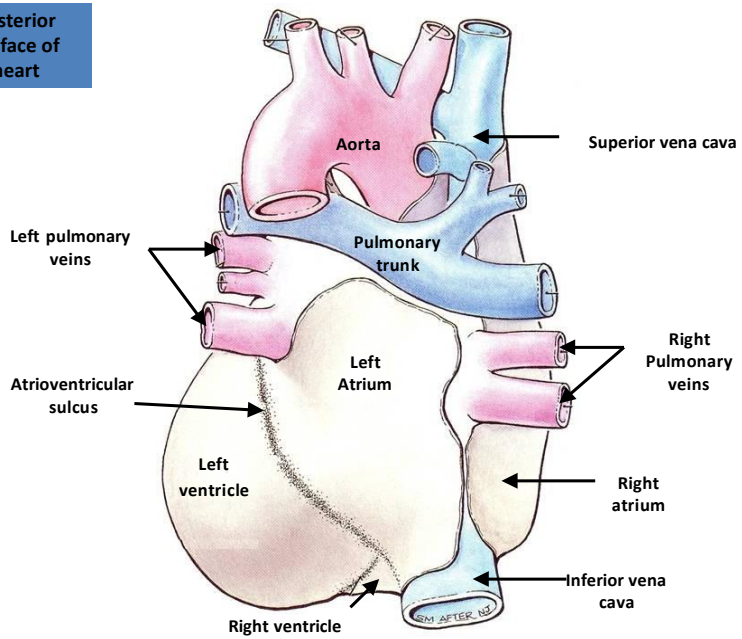
c. Pulmonary valve at the beginning of pulmonary trunk.

d. Aortic valve at the beginning of aorta.

Anterior surface of heart



Posterior surface of heart



- **6- Septa of the heart are two:**
- **1- Inter-atrial septum between Rt. & Lt. atria.**
- **2- Inter-ventricular septum between Rt. & Lt. ventricles.**
- **The conducting system of the heart: modified cardiac muscle fibers which are responsible for initiation&maintenance of cardiac rhythm.**
- **The conducting system is formed of:**
- **1- Sino-atrial node (SAN). 2-Atrio-ventricular node (AVN).**
- **3- Atrio-ventricular bundle (AVB). 4- Right & Left bundle branch.**
- **Aorta: It is the greatest & most important vessel. I have 3 parts:**
- **1-Ascending aorta: It arises from left ventricle. It is smallest part.**
- **It gives two coronary arteries: Right & Left coronary supply heart.**
- **2- The aortic arch: fellows ascending &continues as descending aorta**
- **It gives 3 arteries 1-Right brachio-cephalic artery, gives right subclavian & right common carotid arteries. 2-Left common carotid artery. 3-Left subclavian artery.**
- **3- Descending aorta: It is longest part of aorta. It has two parts:**
- **1- Thoracic part in thoracic cavity to supply thoracic**
- **2- Abdominal in abdominal cavity and supplies abdominal & pelvic organs and the lower limbs.**

- **Respiratory System**

The respiratory system has two portions:

- **(1) Conducting (2) Respiratory.**

The conducting portion (air passages)

- **1-Nose & Nasal cavities. 2-Pharynx.**
- **3-Trachea. 4-Bronchi & bronchioles.**

The respiratory portion comprises: The two lungs contain; the bronchioles, the alveolar ductules, and alveoli.

Larynx

Site: In front of neck anterior to the lower part of pharynx.

Beginning: at the level of C.3.

Ends: At level of C.6. to be continuous below with trachea.

Formation: 9 cartilages; 3 single (thyroid, cricoids & epiglottis) & 3 paried (arytenoids, corniculate & cuniform)

Functions:

1- Air passage, larynx is kept always opened and rigid during respiration by its cartilages, ligaments and membranes.

2- Voice production.

3- The inlet of larynx is closed during deglutition by contraction of muscles controlling the inlet of larynx.

Trachea

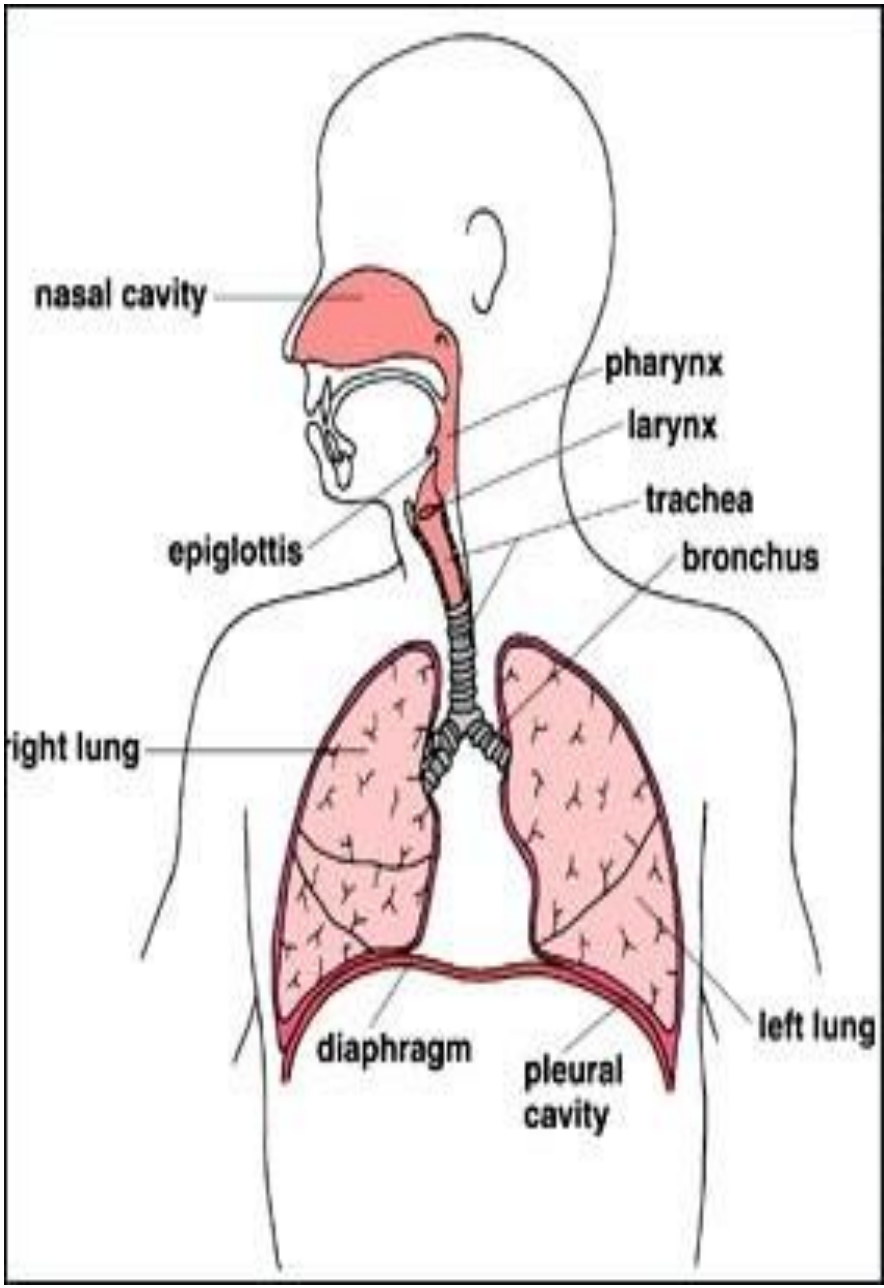
Site & parts: cervical part in front of neck and thoracic part in upper part of thoracic cavity.

Beginning: at level of C.6. below larynx.

Ends: at level T.4 (level of sternal angle) on both sides of 2nd rib the trachea bifurcates into 2 bronchi.

Length: about 10 cm long.

Function: air passage during respiration.



The Bronchi (Rt.& Lt.)

Structure: as trachea. **Beginning:** at level of tracheal bifurcation at T.4.

End: After an oblique course, each bronchus enters the respective lung at the hilus and descends towards the base.

Length: left bronchus(2 inches) & right bronchus(1 inch).

Width: right bronchus is wider(2 inches) & left bronchus(one inch).

Division: right bronchus divided before entering the hilum while left one dividing after entering hilum. **Function**: air passage during respiration.

The lungs

Site: in middle mediastinum of thoracic cavity on both sides of the heart resting upon the two copula of diaphragm.

Length: Rt. Lung is shorter than Lt. **Width (size):**Rt. Lung is wider than Lt. **Level**: Rt. Lung lies at higher level than Lt.

Color: both lungs are reddish-whitein color **Consistency**: health lungs are spongy.

Lobes: 3 in the Rt. Lung (upper, middle & lower) and 2 in the Lt. lung(upper & lower).

Fissures: 2 in Rt. Lung (oblique & transverse) and 1 in the Lt. lung(transverse only).

Shape: Both lungs are conical in shape **has;**1-**Apex** or cervical part lies in neck above clavicle. 2-**Base** rests upon copula of diaphragm.

3-Three borders:

Anterior sharp border contains cardiac notch in left lung only duo to tilting of heart to left. **Inferior border** around the base of lung.

Posterior rounded border related to thoracic vertebra.

4- Three surfaces: Anterior or sterno-costal surface related to ribs & sternum.

Medial or medistinal surface related to the heart and contains root or hilum of lung.

The hilum of the lung contains; pulmonary artery, 2 pulmonary veins and bronchus.

Posterior or vertebral surface related to thoracic vertebrae.

5- Broncho-pulmonary segments: These segments are10 in Rt. Lung (3 upper, 2 middle, 5 lower) 8 in Lt. lung (3 upper & 5 lower).

The Pleura: It is a serous sac surrounding lungs except its root.

Layers of pleura:1- Visceral layer adherent to lung. 2- Parietal layer lining thoracic wall. **Pleural cavity:** It lies in between theme contains pleural fluid. **Function:** facilitate distension of lungs during inspiration.