



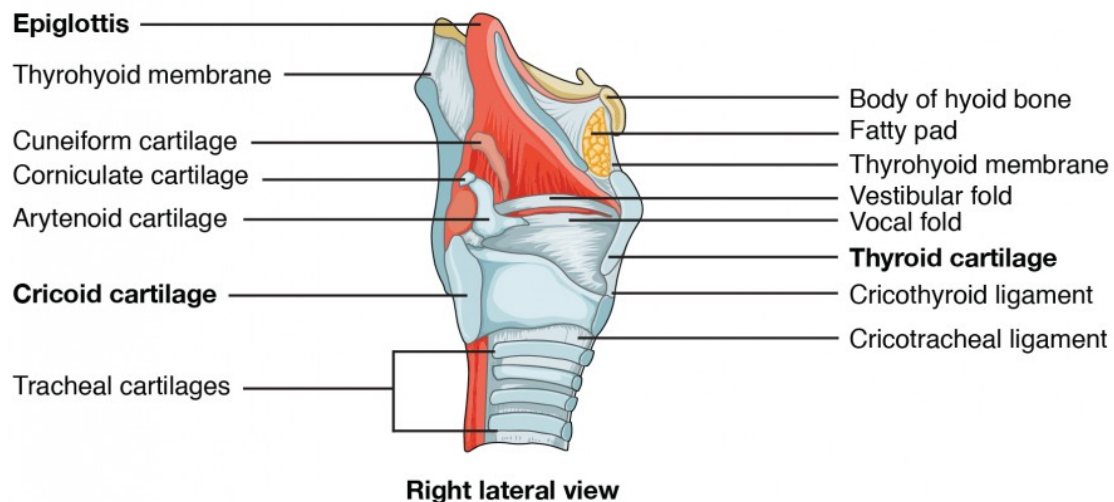
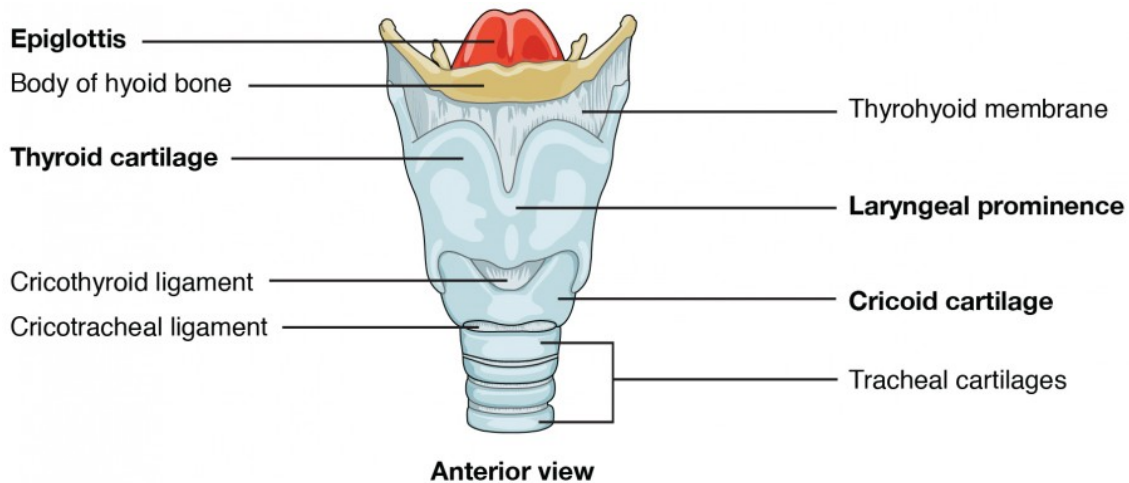
Host: Dr. Charlotte Durand  
 Guest: Dr. Susan Lammi

## 1. Airway

**Using the model, demonstrate the main features of the larynx**

Features you need to know

- Thyroid cartilage
- Cricoid cartilage
- Arytenoid cartilages
- Epiglottis
- Vallecula
- Cuneiform and corniculate cartilages
- Cricothyroid membrane
- Vocal chords



**What are the structures in the upper airway that could lead to airway obstruction?**

Tongue, tonsils, pharynx, epiglottis, glottis

**Demonstrate the landmarks for a cricothyroidotomy.**

The thyroid cartilage above, cricoid cartilage below and the cricothyroid membrane between.

**What cartilage in the larynx is fully circumferential?**

Cricoid cartilage

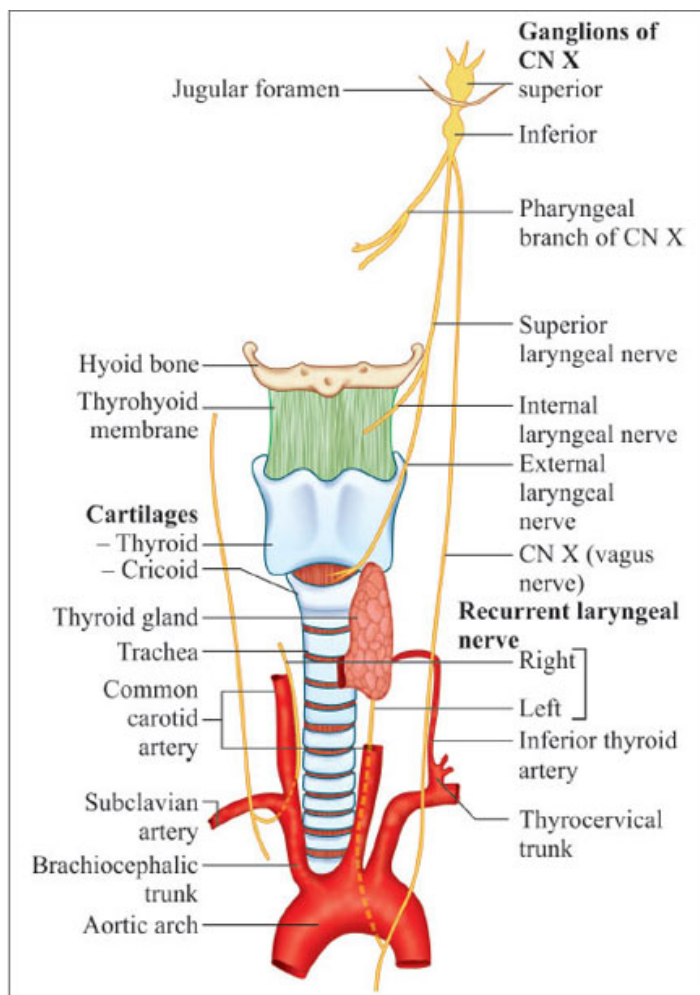
**Name the muscles of vocalisation**

- Cricothyroid - from the anterolateral cricoid to inferior margin and inferior horn of thyroid
- Thyroarytenoid - from the lower ½ posterior angle of thyroid laminae and cricothyroid ligament to the anterolateral arytenoid
- Posterior cricoarytenoid - from the posterior surface of cricoid lamina to the vocal process of arytenoid
- Lateral cricoarytenoid - from the arch of the cricoid to vocal process to the vocal process of arytenoid
- Transverse and oblique arytenoids - from one arytenoid cartilage to the contralateral arytenoid
- Vocalis - lateral surface of the vocal process of arytenoid cartilage to the ipsilateral vocal ligament

**2. Innervation of the airway**

**What is the motor nerve supply of the larynx?**

- All muscles of the larynx are supplied by branches of the Vagus Nerve (X)
- The recurrent laryngeal nerve becomes the inferior laryngeal nerve and supplies all intrinsic muscles except one - the cricothyroid, which is supplied by the superior laryngeal nerve.
- The superior laryngeal nerve is a branch of the vagus, which then gives an internal and external branch. The external branch, called the external laryngeal nerve supplies the cricothyroid membrane.



### What is the sensory supply of the larynx?

- Sensation below the cords = Inferior laryngeal nerve (a branch of the recurrent laryngeal nerve)
- Sensation above the cords = Internal laryngeal nerve (a branch of the superior laryngeal nerve)

### What is the difference between the course of the right and left recurrent laryngeal nerve?

Right: hooks around the subclavian artery

Left: hooks around aorta

After looping they ascend in trachea-oesophageal groove to supply intrinsic muscles of larynx (except the cricothyroid, which, as mentioned above, is supplied by the...superior laryngeal nerve.

**What is the result of an injury to the recurrent laryngeal nerve?**

Hoarse voice if unilateral and stridor if bilateral due to inability to abduct the cords as posterior cricoarytenoids are the only abductors

**3. Anterior neck**

*Note: So important when you are studying this not to forget the images - they love getting you to interpret the anatomy photos for this question.*

*E.g - Identify the venous structures in this photo. Identify the nerves in this photo.*

**Identify the major triangles of the neck**

- Anterior triangle - which can be further divided into the digastric, submental, muscular and carotid triangles
- Posterior triangle

**Define the boundaries of the anterior triangle of the neck**

- Inferior border of the mandible forms the superior border of the triangle
- Midline of the neck is the anterior border
- The lateral border is the anterior part of the sternocleidomastoid muscle

**Describe the course of the internal jugular vein.**

- IJV is the continuation of the sigmoid sinus
- It is formed by the inferior petrosal and sigmoid dural venous sinuses
- Descends within the carotid sheath with the internal carotid artery and the Vagus Nerve
- Lies lateral and ventral to artery
- Passes deep to the heads of SCM (sternal and clavicular heads)
- Joins the subclavian vein posterior to the sternal end of the clavicle
- Forms the brachiocephalic vein

**What major structures are at risk during insertion of an IJ line?**

- External carotid artery
- Common carotid artery
- Vagus nerve
- Other nerves
- Lung, trachea, SCM, thyroid and thoracic duct

**Describe the location of the thyroid gland in the neck**

- Located anteriorly in the neck at the level of C5 to T1
- Lies deep to sternothyroid and sternohyoid muscles
- Right and left lobes sit anterolateral to the larynx and trachea
- A thin isthmus unites the two lobes across the trachea approximately the 2nd and 3rd tracheal rings

#### 4. Carotid Triangle & Vessels

##### Outline the boundaries of the carotid triangle

- Superior belly of the omohyoid
- Posterior belly of the digastric
- Anterior border of the SCM

##### What structures pass through the carotid triangle?

- Common carotid artery
- Internal carotid artery
- External carotid artery and the branches superior thyroid, lingual, facial
- Lymph nodes
- Hypoglossal nerve

##### Name the branches of the external carotid

- Anterior ascending pharyngeal
- Superior thyroid
- Lingual
- Facial
- Posterior Occipital
- Posterior auricular
- Superficial temporal
- Maxillary

##### Describe the surface markings of the carotid sheath in the neck

Carotid sheath runs along a line joining the sternoclavicular joint to a point midway between the mastoid process and the angle of the mandible

##### What are the contents of the carotid sheath

Common carotid artery, internal jugular vein, vagus nerve

*Note: The surface markings question has also been asked as please describe the surface markings of the IJV for a central line, which will be the same landmarks as the carotid sheath because it runs within it.*

##### Discuss the anatomy of the right common carotid artery (2017 Q)

- The right common carotid begins at the bifurcation of the brachiocephalic trunk behind the sternoclavicular joint into the common carotid and subclavian arteries
- In the neck it lies within the medial part of the carotid sheath with the internal jugular vein lateral to it and the vagus nerve between the two vessels.
- The common carotid bifurcates at the level of the upper border of the lamina of the thyroid cartilage (upper border of C4 vertebra) into the external and internal carotid arteries.

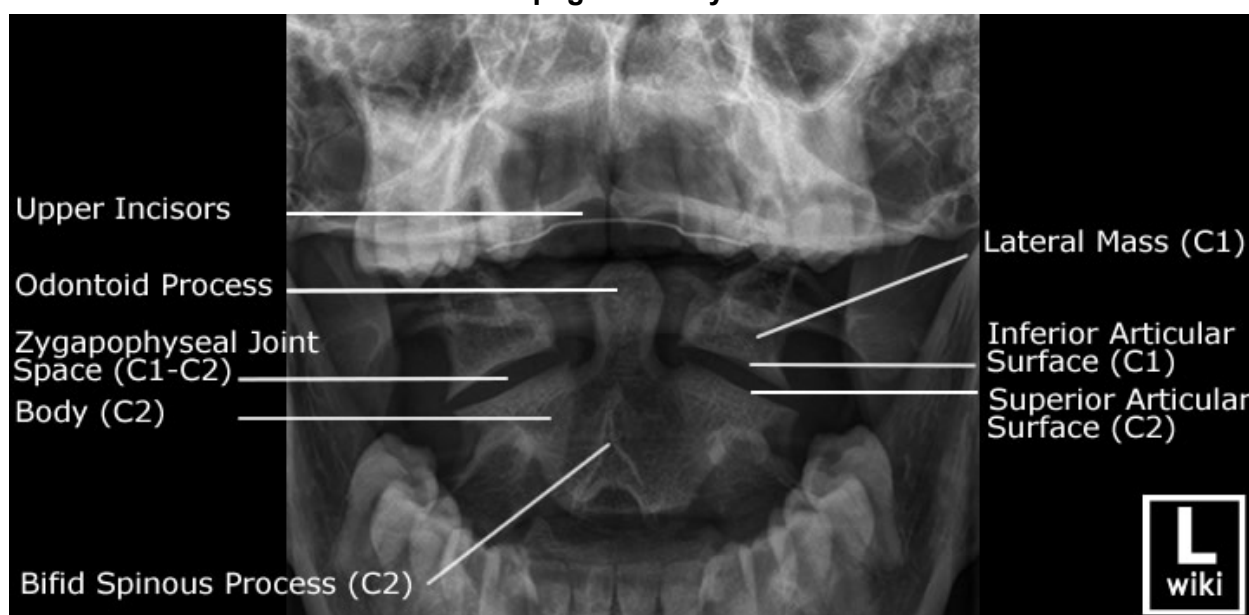
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**What is the course of the right subclavian artery**

- Arises via the brachiocephalic trunk
- Exits the thorax via the superior thoracic aperture
- Travels between the anterior and middle scalene muscles
- Before passing between the first rib and the clavicle
- At the lateral border of the 1st rib, it continues as the axillary artery
- Divided into 3 parts based on the position of the artery in relation to the scalenus anterior
- 1st part - from origin to medial border, 2nd - post to scalene, 3rd part from lateral border of scalene to the first rib

**5. Cervical Spine (C1/C2)**

Be able to outline the landmarks on a peg view xray

**Demonstrate the bony features of the atlas and axis**

- C1 atlas: Anterior and posterior arch, transverse foramen, lateral mass with transverse process, articular facet for dens, superior articular facet, inferior articular facet, anterior and posterior tubercles, vertebral foraminae
- C2/axis: body, odontoid peg (dens), superior and inferior articular facets, lamina, pedicle, transverse process, transverse foramen, bifid spinous process, vertebral foramen. *(need dens plus 5 other features to pass)*

**What are the characteristics of a cervical vertebra?**

- Small oval body with large vertebral canal
- Concave on the on the superior surface and convex on the inferior surface
- Spinous processes are short, bifid and downward sloping
- Facet joints are more horizontal allowing for a greater range of movement

- Anterior and posterior transverse process with a transverse foramen allowing passage of the vertebral artery, vein and sympathetic plexus

### **Describe the joints between C1 and C2**

- 2 Lateral atlanto-axial joints (facet joints) - these are synovial joints between the inferior articular facet of the atlas and the superior articular facet of the axis on each side.
- The median atlanto-axial joint is a synovial joint between the anterior arch of C1 and the dens. This is a pivot joint.

### **Describe the movements of the head on the neck**

- Rotation occurs at the level of C1 on C2 (gliding on the lateral atlantoaxial joints and pivoting on median atlantoaxial joint)
- Flexion and extension (nodding), lateral flexion and rotation occur at the atlanto-occipital joints

### **Which ligaments stabilise the joint between C1 and C2?**

*(Tip: list the name of all of the ligaments BEFORE you add the extra info)*

- Cruciate ligament - sits behind the dens, made up of a strong transverse ligament across the atlas and weaker vertical bands from the back of the body of axis to the occiput. This holds the dens in position and prevents pressure from the dens on the medulla.
- 2 x alar ligaments - from the sides of the dens to the edge of the foramen magnum. They are strong ligaments that limit rotation.
- Apical ligament - from the apex of the dens to the foramen magnum
- Tectorial membrane - a continuation of the posterior longitudinal ligament, attached from the back of body of axis to anterior half of foramen magnum. Lies in front of the dura.
- Ligamentum flavum, nuchal ligament, interspinous ligament and the joint capsule also provide support.

## **6. Thoracic Spine**

### **Demonstrate the bony features of a thoracic vertebra**

- Body, pedicle, transverse process
- Articular facets - superior and inferior
- Costal facets - superior/inferior costal facets (for the head of the rib), transverse costal facet (tubercle of the rib)
- Spinous process, lamina
- Vertebral foramen and space for the intervertebral foramina

### **What movements occur at the thoracic vertebra?**

Rotation, some lateral flexion, very limited flexion and extension

**How does this differ from vertebrae in other regions?**

- Cervical vertebra - smaller body, larger canal, very and often bifid spinous process, a canal for the vertebral artery, facet joints are flatter, no space for ribs
- Lumbar vertebra - larger body, smaller canal, spinous process square and more directly posterior, no articulations for ribs, more prominent transverse processes

**What changes occur as you move from upper to lower thoracic vertebrae?**

- Body goes from heart shaped to more of a kidney shape
- Spinous processes go from long and vertical to shorter and more horizontal
- Facets on transverse processes go from concave to flat
- Costal facets on the body change from demi to single on 10/11/12th vertebrae
- Spinal canal goes from round to triangular  
(need 2 / 5 to pass)

**7. Lumbar Spine****Name the structures your needle would pass through when performing a lumbar puncture**

*(this one you need to know so well you don't even think. It comes up so often)*

- Skin
- Subcutaneous tissue
- Supra-spinous ligament
- Interspinous ligament
- Ligamentum flavum
- Epidural space + veins
- Dura mater
- Arachnoid mater
- Subarachnoid space = CSF

**Describe some of the characteristics of the ligaments passed**

- Supraspinous - continuous down the spine. Strong ligament that is lax in extension and taut in flexion.
- Interspinous - weak ligament
- Flavum - most important ligament. Attaches to the front of the upper lamina and back of the lower lamina

**At what level do you do an LP in an adult and why?**

L3/4, L4/5 or L5/S1 spaces. The spinal cord ends at L2 so below this is the site for LP

**What are the surface anatomical landmarks when performing a lumbar puncture**

- The top of the iliac crests align with the L4 spinous process.
- The space above or below this avoids the cord

**What movements occur at the lumbar spine?**

- Flexion and extension are the main movements



- Lateral flexion
- Very limited rotation

**What factors are responsible for stability between adjacent lumbar vertebrae?**

- Bony factors - orientation of the facets, intervertebral discs
- Ligamentous factors - The major stability comes from ligaments, particularly the anterior and posterior spinal ligaments, the supraspinous/interspinous/intertransverse and ligamentum flavum
- Muscular factors - thick mass of muscle anterior and posterior to the spine, particularly the erector spinae

**What features make this a lumbar vertebra?**

- No costal facets
- No foramen in the transverse process
- Triangular vertebral foramen
- Articular facets lie in the AP plane
- Kidney shaped body
- Larger vertebra
- Mammillary bodies

**BONUS Q - Sacrum (!)**

*This would be slightly unfair but also not unfair at all (it was asked in 2010 )*

**Identify this bone and its features (needed 4 to pass)**

- Sacrum consists of 5 fused bones and the coccyx
- 4 pairs of sacral foramina
- Ala
- Sacroiliac joint
- Superior articular facets
- Lumbosacral joint
- 5 vertical lines - median, intermediate and lateral lines.