

## Carotid triangle

### Curricular Objectives

By the end of this session students are expected to be able to:

### Practical

1. Locate the carotid triangle and its bounding structures
2. Identify the common carotid artery, its bifurcation and the two terminal branches
3. Distinguish the internal jugular vein and its main tributaries
4. Relate the common carotid artery to carotid tubercle
5. Recognize the branches of external carotid artery
6. Distinguish the carotid sinus and its vertebral level
7. Trace the three cranial nerves found in the triangle (CN: X, XI, XII)
8. Discriminate between the roots and loop of ansa cervicalis
9. Feel the pulse of the common carotid artery
10. Mark the course of internal jugular vein using surface landmarks

### Theory

1. Describe the location, boundaries, roof and floor of triangle
2. List the content of the triangle
3. Discuss the carotid sheath regarding its formation, extension, and content
4. Outline the origin, course and important relations of the common carotid artery
5. Compare the courses of internal & external carotid arteries
6. Describe the site, vertebral level, and function of carotid sinus and body
7. Discuss the formation, tributaries and surface markings of internal jugular vein (IJV)
8. Give a simple Definition of (air embolism) and discuss why the IJV is at higher risk
9. Review the course and main branches of the vagus nerve within the triangle
10. List the branches of external carotid artery
11. Summarize the course of each branch of external carotid A (landmarks & distribution)

### Selected references and suggested resources

- ✦ Clinical Anatomy by Regions, Richard S. Snell, 9th edition
- ✦ Grant's Atlas of Anatomy, 13th Edition
- ✦ McMinn's Clinical Atlas of Human Anatomy, 7th Edition
- ✦ [Anatomy for Babylon medical students](#)(facebook page)
- ✦ [Human Anatomy Education](#)(facebook page)
- ✦ [Human anatomy education](#) (you tube channel)

### **This session has been reviewed by:**

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## Session check list

- Important landmarks:
  - Superior belly of omohyoid muscle
    - ✓ begins at the intermediate tendon /Passes upwards/Attached to hyoid bone
  - Thyroid cartilage: its upper border lies at the level of.....vertebra
  - Cricoid cartilage: it lies at the level of..... vertebra
- Boundaries
  - Superiorly: Posterior belly of digastric supplemented by stylohyoid.
  - Antero-inferiorly: Superior belly of omohyoid.
  - Posteriorly: Anterior border of sternocleidomastoid.
- Roof
  - Investing layer of deep cervical fascia.
  - Superficial fascia (platysma, cervical branch of facial nerve and transverse cervical nerve)
- Floor: 4 muscles
  - Hyoglossus/ Thyrohyoid/ Middle constrictor/ Inferior constrictor
- Content:
  1. Carotid sheath(List its contents .....)
  2. Ansa cervicalis
  3. Cervical part of the sympathetic chain.
  4. Deep cervical lymph nodes (along the internal jugular vein)
- **Carotid sheath**
  - Extends between the base of skull above to the arch of aorta below
  - Contents include:
    1. Arteries: .....
    2. Vein: .....
    3. Cranial nerves: .....
    4. Others ....., .....
- **Carotid arteries**
  1. Common carotid artery (CCA)
    - ✓ Is a branch of .....
    - ✓ Ascends in the carotid sheath medial to .....
    - ✓ Bifurcates into ..... and ..... opposite to .....at the level of ..... vertebra

**Note:** It is in this triangle that the carotid pulse can be palpated. The artery can also be compressed against carotid tubercle (ex: to stop bleeding).

    - ⊕ At which vertebra this tubercle lies?
    - ⊕ Which surface landmark can be used to locate it?
    - ⊕ Can you recall any branch of this artery other than its two terminal branches?
  2. Internal carotid artery (ICA)
    - ✓ Mainly supplies the brain and the orbits
    - ✓ Ascends up to reach the posterior part of submandibular triangle by passing deep to.....
    - ✓ Has **no branches** in the neck

## 3. External carotid artery (ECA)

- ✓ Starts at the level of ....., ascends up, anterior to ICA, enters the Digastric triangle by passing deep to ....., enters the parotid gland.
- ✓ Branches of ECA(only the first 5 branches exit the artery within the carotid triangle)
  1. Ascending pharyngeal artery
  2. **Superior thyroid artery (descends downward, forward to .....) )**
  3. **Lingual artery (passes forward to .....) )**
  4. **Facial artery (ascends upward to .....) )**
  5. Occipital artery
  6. Posterior auricular artery
  7. **Superficial temporal artery**
  8. **Maxillary artery**

**Note:** the ECA can be differentiated from ICA, as the latter has no branches in the neck

➤ **Carotid sinus**

- ✓ *Dilatation* at the terminal part of CCA or at the beginning of ICA.
- ✓ It is innervated by ....., ....., and..... nerves.
- ✓ Acts as a baro-receptor (pressure receptor), regulates blood pressure of cerebral arteries

➤ **Carotid body**

- ✓ Small, oval structure, behind the bifurcation of CCA
- ✓ Nerve supply: Similar to carotid sinus
- ✓ Acts as a chemoreceptor, Explain how.....?

➤ **Internal jugular vein (IJV)**

- ✓ Discuss the statement (*IJV is the principal vein of the head and neck*)
- ✓ Largest vein in the neck
- ✓ Is a continuation of ..... above
- ✓ Descends vertically downward lateral (Posterolateral) to ICA and CCA
- ✓ Terminates below by joining .....to form .....
- ✓ Tributaries: (within the triangle)
  1. Lingual vein.
  2. Common facial vein.
  3. Superior thyroid vein

• **Surface anatomy:**

Mark the course of the vein by drawing a vertical line from a midpoint between the mastoid process and the angle of the mandible above to the sternoclavicular joint below

• **Applied anatomy:**

1. Jugular venous pressure (JVP)
2. Central venous catheter

⊕ Sketch a simple diagram showing the triangle at which the IJV can be seen on the neck

**Freeze this video at 1.48 minute and look at the area pointed to help you sketch**

<https://www.youtube.com/watch?v=jvO1J5NoDis>

➤ **Ansa cervicalis (C1,2,3)**

- ✓ U-shaped nerve loop
- ✓ Embedded in the anterior wall of carotid sheath
- ✓ Superior root C<sub>1</sub>: branch of..... nerve as it accompanies it in part of its course.
- ✓ Inferior root C<sub>2,3</sub>

➤ **Vagus nerve (CN X)**

- ✓ Take a vague course with wide distribution to head, neck, thorax and abdomen
- ✓ Descends in a vertical course between the ICC and CCA medially and IJV laterally
- ⊕ List two branches of the nerve given in the carotid triangle. Discuss their distribution.

**Home work:**

- ⊕ Sketch a simple diagram to illustrate the area supplied by the external carotid artery and compare it with that of the internal.
- ⊕ Air embolism is a serious complication of many wounds and surgical procedures.
  1. What is air embolism
  2. Explain why it may be seen after a lacerated wall of the internal jugular vein

**Clinical problem:**

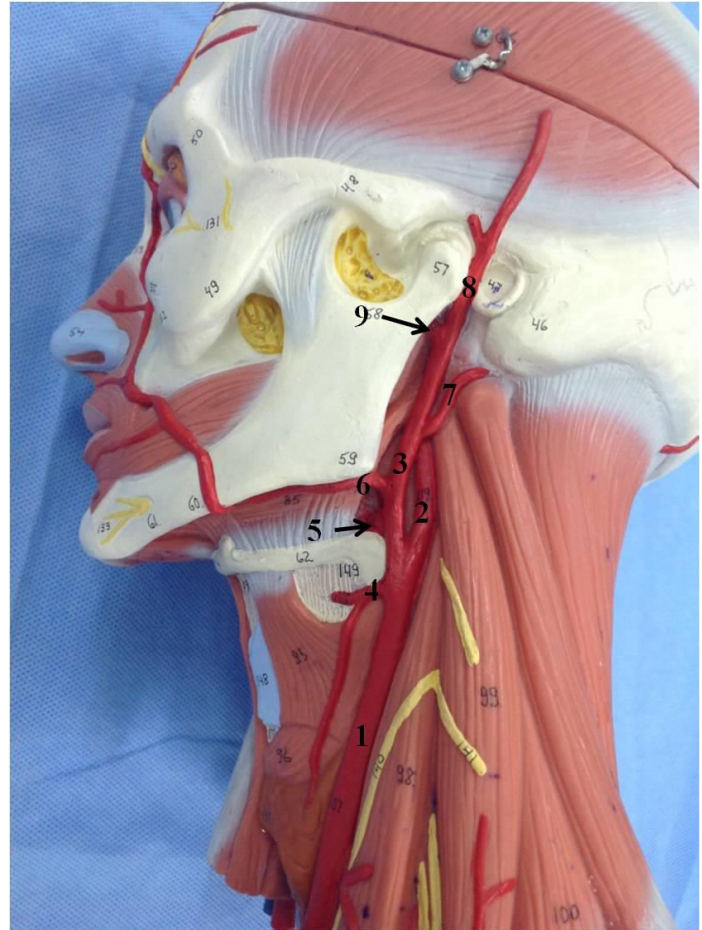
A working man started to suffer from sudden attacks of syncope on rotation of head especially when wearing a shirt with tight collar or a tie with tight knot. The doctor suspects a diseased Carotid sinus.

- 1- Where the sinus is located?
- 2- At which vertebral level it lies?
- 3- It seems that applying pressure on this sinus causes syncope, how?

**Review questions:**

**Q1: The main arteries of the head and neck are shown in this figure (side of the neck). Fill in the blanks with the number of the artery that best completes the statement**

- A. The artery supplying the thyroid gland is .....
- B. The artery supplying the tongue is .....
- C. The main arterial supply of the face comes from .....
- D. The main arterial supply of the upper jaw and teeth originates from.....
- E. The blood supply to the brain comes mainly from .....
- F. The structure that is sensitive to  $CO_2$  changes in blood lies behind .....at the level of upper border of thyroid cartilage.
- G. The palpable pulse, usually felt just in front of the ear is produced by ..... artery



**Q2: All of the following are contents of carotid sheath except:**

- (a) Common carotid artery
- (b) Internal carotid artery
- (c) External carotid artery
- (d) Internal jugular vein
- (e) Vagus nerve