

Introduction to head and neck

Curricular Objectives: By the end of this session students are expected to:

Theory

1. Define the head and neck regions
2. List the bones forming the skeleton of head and neck
3. Describe the different parts of skull, its bones and joints between them
4. List the main features of cervical vertebra
5. Describe the attachment, innervation & importance of sternocleidomastoid & trapezius
6. Divide the neck into triangles
7. Outline the different regions of the head
8. Summarize the cross sectional topography of the neck (fascia and compartments)
9. Discuss the attachment of deep cervical fascia of the neck (superior and inferior)
10. Outline the major surface markings on the head and neck

Practical

1. Identify the head and neck regions
2. Locate the bones forming the skeleton of head and neck
3. Identify major parts and sutures of skull
4. Distinguish different parts of typical cervical vertebrae
5. Name and identify the atypical cervical vertebra and their parts
6. Differentiate between the typical and atypical cervical vertebra
7. Discriminate cervical vertebrae from all other vertebrae
8. Identify the sternocleidomastoid and trapezius muscles
9. Locate the two main triangles of the neck and different regions of the head
10. Trace the different layers of the cervical fasciae in cross sections and gross specimens
11. Discriminate the compartments of the neck and the structures within
12. Inspect and feel the different regions and surface markings of the head and neck
13. Count the cervical vertebra in a given X-ray

Lab advice

Whenever possible, try to practice finding the listed anatomical landmarks on yourself or on your colleagues to develop skills of examination. Try doing this in all labs.

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)
- ✦ [Anatomy for Babylon medical students](#) (youtube channel)
- ✦ [Human Anatomy Education](#) (facebook page)
- ✦ [Human anatomy education](#) (youtube channel)

Feedback and suggestions

- ✦ <http://goo.gl/forms/SjyjGeUpvH>

Session check list

❖ Clinical highlights

- Thyrotoxicosis/ goiter, sinusitis, headache, toothache and facial palsy are some of the common clinical conditions involving the head and neck
- **Thorough understanding** of head and neck anatomy is a must for all Dentists in order to be able to safely treat dental and oral problems in such patients

❖ Head

- It encloses & protects many vital structures including brain, meninges & special sense organs
- Bones: skull
- It is divided into two parts: cranium and face
- Anatomical structures mark the lower limit of the head include
 - ✓ External occipital protuberance / Mastoid process / Lower border of the mandible

❖ Regions of the head

- For descriptive purposes the head is divided into the following regions: Frontal, parietal, occipital, temporal, auricular, parotid, orbital, nasal, zygomatic, buccal, oral, and mental

❖ Skull

- Divided into 2 main parts: Neurocranium (contain the brain)/ Viscerocranium (facial skeleton)
- It has numerous foramina for cranial nerves and vessels passing into and out of the cranium
- It contains cavities of the upper gastrointestinal and respiratory tracts (oral and nasal cavities).

❖ Neck

- It supports the head on the trunk and permits its movement
- It transmits vital structures between the head, thorax, and upper limb.
- Structures within the neck:
 1. Bones: 7 cervical vertebra, hyoid bone
 2. Muscles: (ex: sternocleidomastoid, trapezius)
 3. Vessels: (ex: carotid arteries, jugular veins)
 4. Nerves: (ex: cranial nerves, brachial plexus, cervical plexus)
 5. Larynx and trachea (respiratory organs)
 6. Pharynx and esophagus (gastrointestinal organs)
 7. Thyroid and parathyroid glands (endocrine organs)

❖ Sternocleidomastoid muscle

- It is the key muscle of the neck
- It takes origin from _____ to be inserted to _____
- Its motor supply comes from _____ nerve
- In addition to its actions on the head, It is involved in
 1. Forced inspiration (accessory muscle)
 2. Fracture clavicle (pull the medial segment upward)

❖ Trapezius muscle

- It is the most superficial muscle on the back of the neck
- Its motor innervation is similar to that of sternocleidomastoid muscle
- Refer to your text for parts and actions

❖ Triangles of the neck

- For descriptive purposes the neck is divided into two triangles, anterior and posterior.
- Sternocleidomastoid, trapezius, clavicle and an imaginary midline form their boundaries
- Anterior and posterior triangles are located anterior & posterior to sternocleidomastoid muscle
- These triangles are covered by deep fascia of the neck

❖ Cervical vertebra

- There are 7 cervical vertebrae
- They support the skull and allow the head to move
- They transmit and protect the spinal cord and the vertebral artery
- They can be easily distinguished from thoracic, lumbar, sacral and coccygeal vertebrae

❖ Compartments and fascia of the neck

- Structures within the neck are grouped into 4 compartments (vertebral, visceral, & 2 vascular)
- Each of these compartments is surrounded by its own part of deep cervical fascia
- Clinical importance
 1. Allows movement between adjacent structures
 2. Determine how infection and cancer spread in the neck.
 3. Facilitates the surgical approach to specific areas.

Lab Activity List

For each task below, identify the listed structures then answer the related questions

❖ Task 1 (Head)

- Regions:
 - ✓ Frontal, Parietal, Occipital, Temporal, Auricular, Parotid
 - ✓ Orbital, Nasal, Zygomatic, Buccal, Oral, And Mental
- Special sense organs: Eyes/ Ears/ Nose/ Tongue

❖ Task 2 (Skull)

- Cranium
 - ✓ Neurocranium/ Viscerocranium/ Cranial sutures
 - ⊕ What are sutures?
- Neurocranium
 - ✓ Cranial vault/ Cranial cavity / Brain
 - ✓ Base/ Cranial foramina/ Cranial nerves
 - ⊕ What is the role of skull foramina
- Viscerocranium (facial skeleton)
 - ✓ Face: Orbital cavity, Nasal cavity, Oral cavity
 - ✓ Mandible
- Useful bony markings
 - ✓ External occipital protuberance/ Superior nuchal line
 - ✓ Mastoid process/ Lower border of mandible

- ✦ **Palpate & describe:** With the tips of your fingers try to feel the last four bone markings on your head then describe how to find them.

❖ Task 3 (Neck: bones and cartilages)

- Thyroid cartilage/ Hyoid bone
- Cervical vertebrae/ Vertebral foramen/ Vertebral canal/ Spinal cord
- Typical cervical vertebrae:
 - ✓ Body, Pedicles, Laminae, Spinous Process, Vertebral Foramen, Transverse Foramen
 - ⊕ What feature distinguishes cervical vertebrae from all other vertebrae?
 - ⊕ What lies between bodies of two cervical vertebrae?
 - ⊕ Which parts of the vertebra surrounds the vertebral canal? List the content of the canal
- Atlas vertebra:
 - ✓ Anterior and posterior arches, lateral masses, fossa for dens
 - ⊕ Name the structures articulating with the superior and inferior surfaces of the lateral mass
- Axis vertebra:
 - ✓ Dens (odontoid process)
 - ⊕ The dens articulates with which vertebra?
- Vertebra prominens (7th cervical vertebra) / non bifid spinous process

❖ Task 4 (Neck: Muscles and triangles)

- Sternocleidomastoid / Trapezius
 - ✓ Anterior and posterior borders of sternocleidomastoid muscle/ Lesser supraclavicular fossa
 - ✓ Anterior free border of trapezius muscle
 - ⊕ What nerve provides motor supply to these muscles?
- Anterior and posterior triangles
 - ⊕ What forms the boundaries of each triangle?

❖ Task 5 (Neck: compartments and fascia):

- Compartments (can be seen in cross section of the neck)
 - ✓ Vertebral: Muscles/ Cervical Vertebra
 - ✓ Visceral: Trachea/ Esophagus/ Thyroid Gland
 - ✓ Vascular: Carotid Artery/ Internal Jugular Vein
 - ❖ How many fascial layers can you count? Name these layers
- Deep fascia of the neck
 - ✓ Investing layer of deep cervical fascia
 - ✓ Prevertebral fascia/ Pretracheal fascia/ Carotid sheath
 - ❖ List the structures invested by Investing layer of deep cervical fascia

❖ Task 6 (Head and Neck: surface anatomy):

- Anterior Aspect
 - ✓ Symphysis menti/ Body of the hyoid bone
 - ✓ Upper border of the thyroid cartilage/ Cricoid cartilage
 - ✓ Trachea/ Suprasternal notch
- Posterior Aspect: Vertebra prominens
- Lateral Aspect: Clavicles

Review questions

1. What are the bony markings that can be felt (palpated) at the lower extent of the neck?
2. Trapezius takes origin from _____ to be inserted to _____
3. What anatomical structures involved in moving the head on the neck?
4. How to differentiate typical from atypical cervical vertebra?
5. With the tips of your fingers try to feel the spinous process of the last cervical vertebra, and then describe how to find it.
6. What are the structures located within the visceral compartment?
7. The anterior triangle is bounded by which ONE of the followings?
 - A. Anterior border of trapezius muscle
 - B. Upper border of clavicle
 - C. Imaginary line from mandible to sternum
 - D. Lower border of hyoid bone
 - E. Posterior border of sternocleidomastoid muscle

Homework

1. In the image below, the child has an abnormal position of the head.
 - A. Which anatomical structure is damaged to produce this position? Describe its action
 - B. Can this abnormality be seen in adults? Why?



Image source: <http://www.cranialtech.com/my-babys-head-shape/torticollis/>

2. In the radiograph on the right, a fractured clavicle can be seen.
 - A. Where is the weakest point of the clavicle?
 - B. The proximal segment is displaced upward, why?

Image source:

<https://en.wikipedia.org/w/index.php?curid=39495972>



3. Ask a family member for permission to examine (palpate) his neck. What are the bony markings that can be felt at the lower extent of the neck?