

OUTLINE

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INTRODUCTION TO THE HEAD AND NECK

- The neck consists of several muscles, glands, and parts of the digestive and respiratory organs. It transmits blood vessels to and from the head
- The skeleton of the neck includes 7 cervical vertebrae and 1 hyoid bone
- Typical cervical vertebrae include C3, C4, C5 and C6 vertebrae (Fig. 13.1)
- Atypical cervical vertebrae include C1 (atlas), C2 (axis) and C7 (vertebra prominens)
- There are several muscles in the neck, including platysma and sternocleidomastoid
- Organs of the neck are arranged in 3 layers: respiratory layer (larynx and trachea), digestive layer (pharynx and oesophagus) and endocrine layer (thyroid and parathyroid glands). These are surrounded and separated by fibrous sheets (cervical fasciae)
- The plexus of nerves in the neck is the cervical plexus;
- Bones of the head include the skull (including mandible) (Fig. 13.2). The skull accommodates the brain, some sense organs (eyes, ears, nose) and glands,
- The bones of the skull include 8 cranial bones (neurocranium: 2 temporal, 2 parietal, 1 occipital, 1 frontal, 1 sphenoidal and 1 ethmoidal bones); and 14 facial bones (viscerocranium: maxilla, lacrimal bone, inferior nasal concha, zygomatic bone,

- nasal bone, palatine bone, vomer and mandible)
- The interior of the base of the skull accommodates the brain and is compartmentalized into 3 cranial fossae (anterior, middle and inferior cranial fossae)
- The mandible articulates with the temporal bone at the temporomandibular joint (TMJ). The mandible is a U-shaped bone with a body and 2 rami

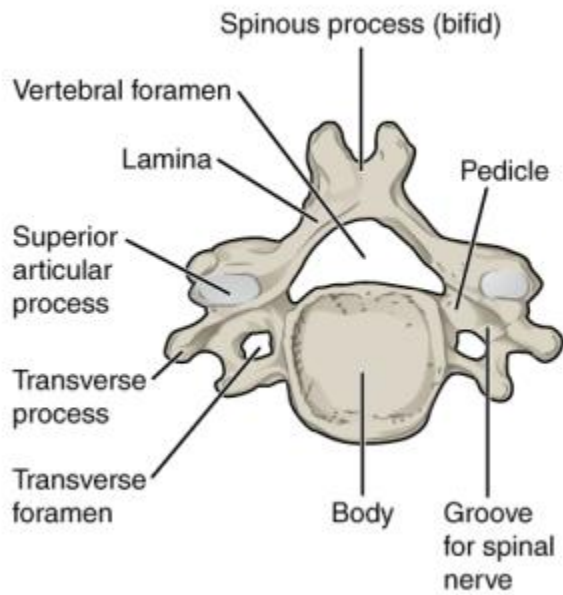


Fig. 13.1 Typical Cervical vertebra (Kaiser *et al.*, 2023)

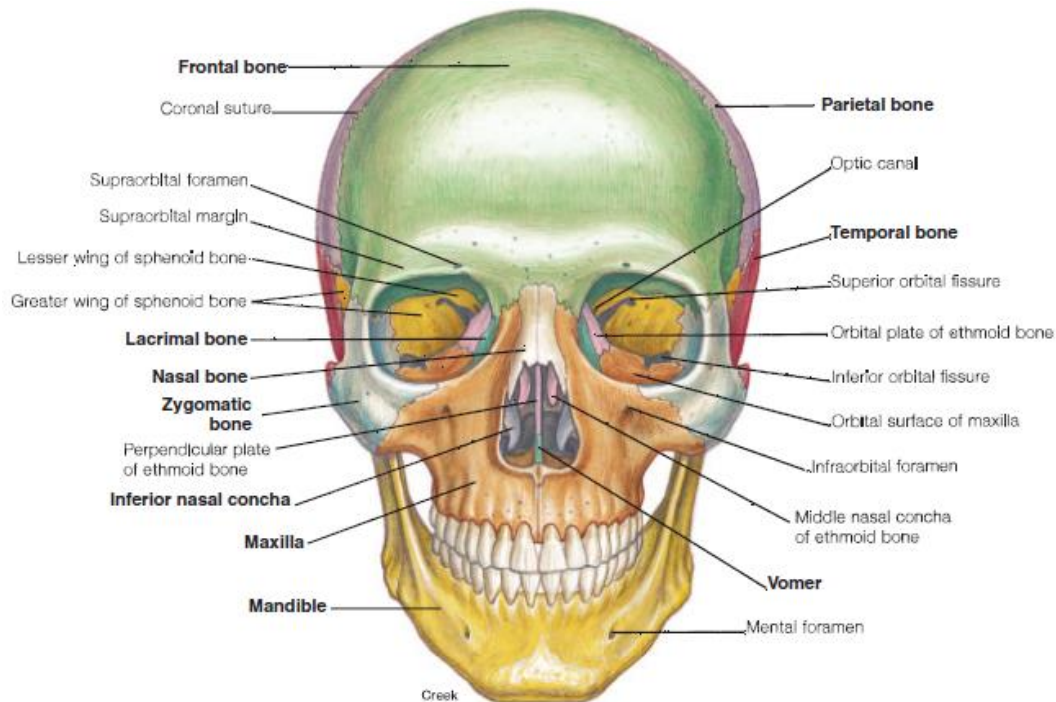


Fig. 13.2 The skull (anterior view) (Van De Graaff, 2002)

FACE AND SCALP

- The face extends from the forehead above to the chin below, and from one auricle to the other
- Several muscles of the face are responsible for changing facial expressions
- The scalp is a 5-layered structure that lines the calvaria (skull cap) externally. It is richly vascularized and bleeds profusely if lacerated

ORBITS, EYELIDS AND LACRIMAL APPARATUS (Fig. 13.2)

- The orbit is the pyramidal bony compartment that accommodates the eye and the structures around it
- Each eyelid is a fold of skin and fibrous tissue that forms a cover for the eye. Each has glands and eyelashes associated with it
- The lacrimal apparatus consists of the lacrimal glands (that produce tears), lacrimal canaliculi, lacrimal sac and nasolacrimal ducts.

THE EYEBALL

Each eyeball occupies the orbit (socket). It is the organ of sight

- The eyeball has 3 structural coats: outer **fibrous coat** (sclera and cornea), middle **vascular coat** (choroid, Ciliary body and iris) and inner **retina** (that contains photoreceptors)
- The **refractive media** of the eye include cornea, aqueous humour, lens, and vitreous body

- Each eye is surrounded by several **extraocular muscles** (4 rectus and 2 oblique muscles) that move the eye,
- **Refractive errors** can involve any of the refractive media, especially the cornea and lens

TEMPORAL REGION OF THE HEAD (Fig. 13.2)

- The temporal region (temple) lies on the side of the head. The temporalis muscle occupies the temporal fossa on the side of the skull Infratemporal Fossa
- This is a space located behind the maxilla and below the greater wing of the sphenoid
- Contents of the Infratemporal fossa include: pterygoid muscles, maxillary vessels, otic ganglion and mandibular nerve (and its branches)

ORAL (BUCCAL) CAVITY

- The oral cavity lies below the palate. It consists of the vestibule and the oral cavity proper
- Contents of the oral cavity include the tongue, sublingual gland (in the sublingual fold), etc.

Tongue (Fig. 13.3)

- The tongue is a mobile muscular organ located in the oral cavity. Its anatomical parts include root, body, apex, dorsum and inferior surface. There are several named muscles of the tongue
- The tongue is endowed with several taste buds and papillae (filiform, vallate, fungiform and foliate papillae)
- Embryologically, the tongue begins to develop in the 4th week as swellings in the floor of the primitive pharynx
- Ankyloglossia (tongue-tie) impedes the mobility of the tongue, owing to the brevity of the frenulum
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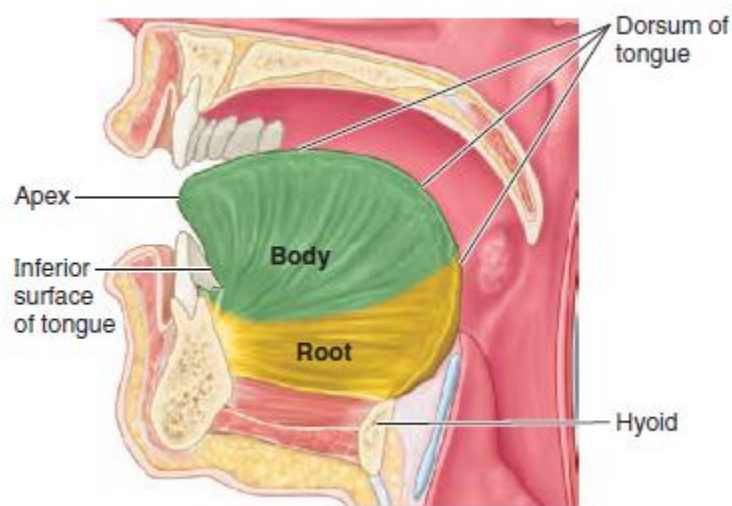


Fig. 13.3 The parts of the tongue (Moore et al., 2014)

Salivary Glands

- There are major and minor salivary glands, and these are associated with the buccal cavity
- The paired major salivary glands include the parotid, submandibular (submaxillary) and sublingual glands
- Mumps is the viral infection of salivary glands, affecting especially the parotid gland.
- In Sjogren's syndrome, immune cells damage the parenchyma of exocrine glands, including salivary glands, and this results in xerostomia

NOSE (Fig. 13.4)

External nose

- This is the part of the nose that projects onto the face
- Skeleton of the external nose is osseocartilagenous; and its anatomic parts include root, apex, dorsum and alae

Nasal Cavities

- The nasal cavities lie above the palate. The two cavities are separated in the midline by a nasal septum
- Each nasal cavity communicates with the exterior via the anterior naris (nostril) and behind with the nasopharynx via the posterior naris (choana)
- Boundaries of each nasal cavity include a roof, floor, medial wall (nasal septum), and lateral wall
- Vestibule of the nasal cavity is the region directly behind the anterior naris
- The mucosa of the nasal cavity has an olfactory part (bearing receptors for olfaction) and a respiratory part
- The lateral wall of the nasal cavity possesses 3 elevations (conchae) that separate air passages called meatuses

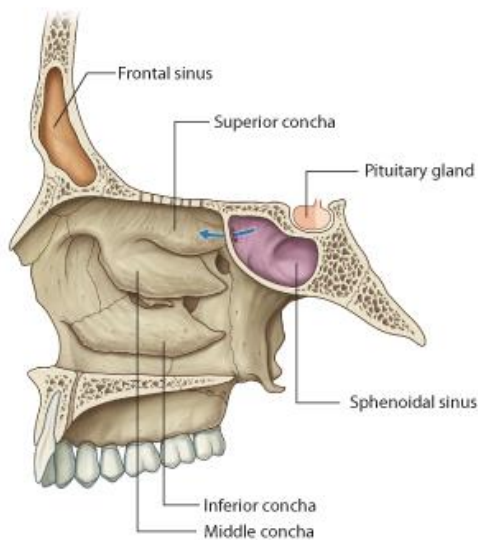


Fig. 13.4 Nasal cavity (lateral wall)

PARANASAL SINUSES (Fig. 13.4)

- Paranasal sinuses are air-filled cavities located in the bones of the skull (around the

- nasal cavities). They include frontal, maxillary, sphenoidal and ethmoidal sinuses
- Mucosa of paranasal sinuses is continuous with that of the nasal cavity such that infections may spread either ways
- Paranasal sinuses add to the resonance of the voice and lightens the weight of the skull
- Polyps are abnormal outgrowth of paranasal mucosa and could perturb breathing.

EAR

- Ears are the organs of hearing and balance. Each consists of external ear, middle ear (tympanic cavity) and internal ear
- External ear consists of the auricle (pinna) and external acoustic meatus
- The middle ear is a air-filled cavity in the petrous temporal bone. It contains the auditory ossicles (malleus, incus and stapes)
- Between the external and middle ears is the tympanic membrane (ear drum)
- The internal ear is made of bony labyrinth and membranous labyrinth. It a fluid-filled cavity and contains receptors for hearing and balance. The bony labyrinth consists of the vestibule, cochlea and semicircular canals; while the membranous labyrinth consists of the utricle, saccule and semicircular ducts
- Lesions in the internal ear could manifest as deafness, vertigo, motion sickness, tinnitus, Meniere syndrome, etc.

FASCIAE AND TRIANGLES OF THE NECK (Fig. 13.5)

- Layers of fibrous tissue (cervical fasciae) surround the muscles and organs of the neck. Named cervical fasciae include investing fascia, pretracheal fascia, prevertebral fascia and carotid sheath
- The anterolateral region of the neck is divisible into anterior and posterior triangles, separated by the sternocleidomastoid and bounded by muscles and fasciae. These triangles contain glands, blood vessels, lymph nodes, etc
- The spread of infectious fluid in the neck depends on the fascial arrangement

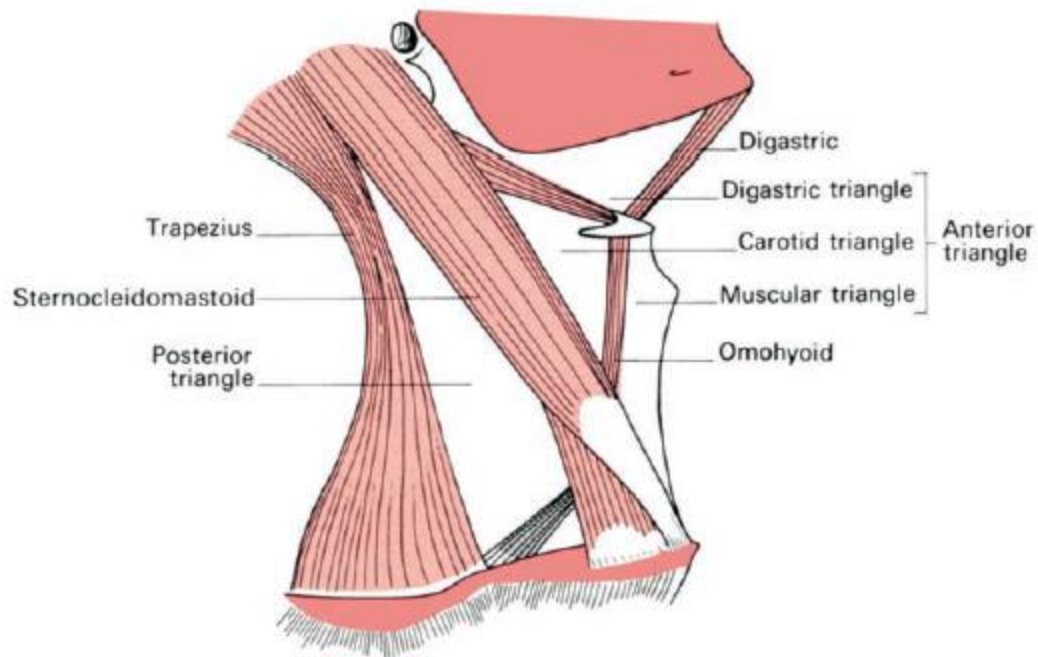


Fig. 13.5 Triangles of the neck (Ellis, 2006)

PHARYNX AND LARYNX

- The **pharynx** is the fibromuscular tube located behind the nasal, oral and laryngeal cavities. It is divisible into 3 parts, namely: nasopharynx, oropharynx and laryngopharynx
- The **larynx** (voice box) is the organ of phonation and a conduit for air. The laryngeal patency is maintained by 3 paired and 3 unpaired cartilages
- Several intrinsic muscles (e.g. cricothyroid, oblique arytenoid) are involved in sound production as they control the size of the glottis

ENDOCRINE ORGANS OF THE NECK

- Endocrine glands of the neck include the thyroid and parathyroid glands.

Thyroid Gland

The thyroid gland (Fig. 13.6)

- Is a highly vascular endocrine organ located in the lower part of the neck, from the C5 vertebra above to the T1 vertebra below
- Is invested by a thin fibrous *capsule* which sends septa into the substance of the gland
- Consists of a median **isthmus** and two **lobes** (right and left)

- Has a *parenchyma* whose cells are arranged into **follicles**. These follicles elaborate *thyroid hormones* (tri-iodothyronine and tetra-iodothyronine or thyroxine) that are critical for the regulation of cell metabolism.
- Becomes markedly enlarged in goiter, partly owing to dietary iodine deficiency.

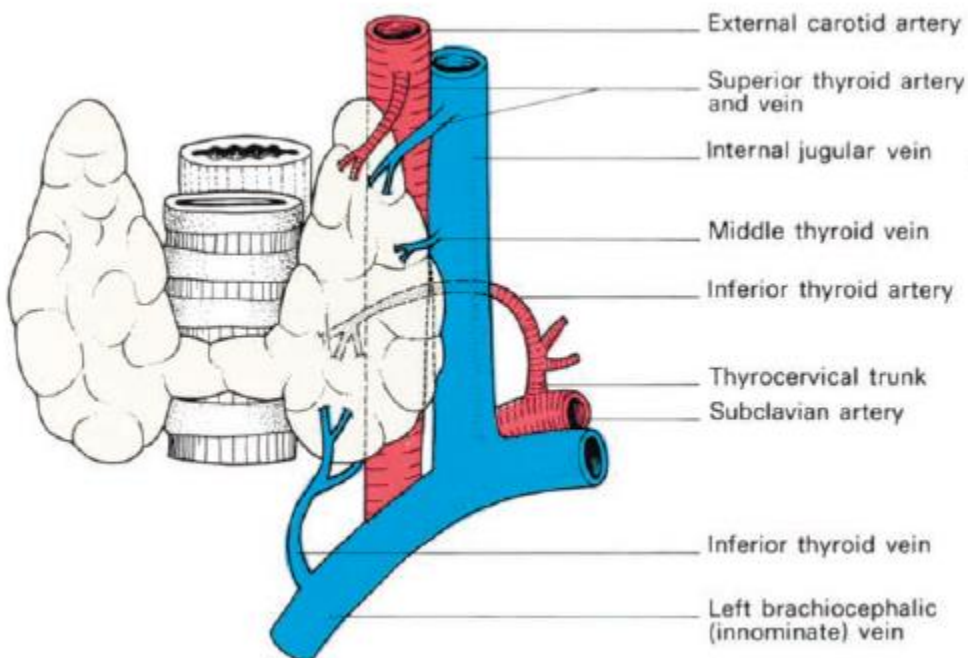


Fig. 13.6 The thyroid gland and related vessels (Ellis, 2006)

Parathyroid Glands

The parathyroid glands

- Are minute ovoid yellowish-brown endocrine organs located posterior to (and within the fibrous capsule of) the thyroid gland, two on each side (superior and inferior)
- Are made up of a **parenchyma** that consists of **principal** (or chief) **cells**. These cells are arranged in *columns* (separated by sinusoids), and they produce **parathyroid hormone**
- Parathyroid hormone is involved in calcium metabolism by facilitating the mobilization of calcium from bones into the plasma, etc.

MENINGES AND DURAL VENOUS SINUSES

- The meninges are membranes that surround and compartmentalize the brain. They include dura matter (pachymeninx); arachnoid and pia matters (leptomeninges)
- The cranial dura matter has two layers (endosteal and meningeal layers)
- Dural sinuses are endothelium-lined venous channels formed between the endosteal and meningeal layers of the dura
- Paired dural sinuses include transverse, sigmoid, cavernous, sphenoparietal, superior petrosal, inferior petrosal sinuses (Fig. 13.6)
- Unpaired dural venous sinuses include superior sagittal, inferior sagittal, straight, occipital and basilar sinuses
- Dural venous sinuses drain the brain, eyeball, etc., and communicate with veins of the face and scalp. As a result, infections of the face and scalp could spread to the meninges and the brain via these venous channels

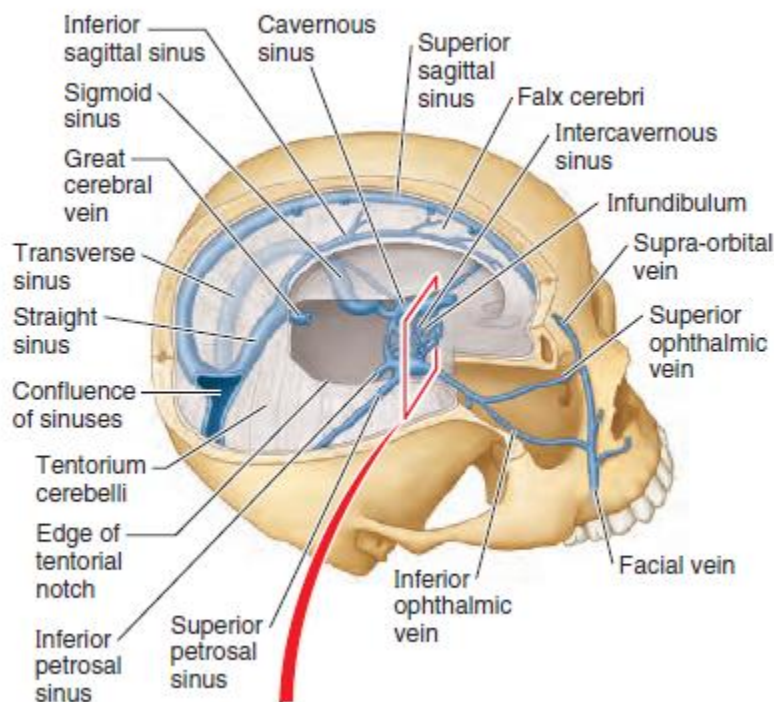


Fig. 13.7 Dural venous sinuses (Moore *et al.*, 2014)

CASE STUDY

- A two-year-old girl was taken to her paediatrician because of persistent severe earache. During otoscopy, the physician noted a bulging infected tympanic membrane. Her parents disclosed that the girl recently had throat infection and cold.
 - How could an infected throat be associated with bulging and infection of the tympanic membrane?
 - Can the infection spread further if untreated and which structures could be involved?

Short answer questions

1. Enumerate:
 - a) Layers of scalp
 - b) Arteries supplying face
 - c) Structures passing through the parotid gland
2. Briefly discuss the muscles of mastication
3. Draw a labelled diagram to show Ansa cervicalis
4. Write short notes on
 - a) Submandibular ganglion
 - b) Dangerous area of the face
 - c) Lymphatic drainage of the face
5. Describe the temporomandibular joint under the following headings
 - a) Type
 - b) Capsule and ligaments
 - c) Movements and muscles responsible for causing movements
 - d) Applied anatomy

MCQ (1 in 5 Questions)

Instruction: choose the correct answer from options (a) to (e)

- 1. Which of the following bones bound the middle cranial fossa**
 - a) Petrous temporal bone laterally
 - b) The body of the sphenoid bone forms the central part of the floor
 - c) The greater wing of the sphenoid bone forms its anterior border
 - d) The squamous part of the temporal bone forms its posterior wall
 - e) The cribriform plate of the ethmoid bone completes its floor anteriorly
- 2. Lesions in the internal ear could manifest as one of the following except**
 - a) Vertigo
 - b) Postural imbalance
 - c) Grave's disease

- d) Motion sickness
- e) Meniere syndrome
- 3. Besides the zygomatic bone, which of the following bones forms the other part of the zygomatic arch?**
 - a) Temporal Bone
 - b) Maxillae
 - c) Sphenoid
 - d) Palatine Bone
 - e) Mandible
- 4. Which of these is not the terminal branch of the facial nerve**
 - a) Temporal
 - b) Zygomatic
 - c) Maxillary
 - d) Mandibular
 - e) Cervical
- 5. Which of the following muscle groups inserts directly on the hyoid bone?**
 - a) Geniohyoid, stylohyoid, and omohyoid muscles
 - b) Masseter, stylohyoid, and digastric muscles
 - c) Masseter, buccinator, and omohyoid muscles
 - d) Palatopharygeus and palatoglossus muscles and muscle of the uvula
 - e) None of the above

ANSWERS

MCQ

- 1. b
- 2. c
- 3. a
- 4. c
- 5. a

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