



SURFACE ANATOMY

Surface Landmarks of the Head

Nasion

The nasion is the depression in the midline at the root of the nose (Fig. 11.128).

External Occipital Protuberance

This is a bony prominence in the middle of the squamous part of the occipital bone (Fig. 11.128). It lies in the midline at the junction of the head and neck and gives attachment to the ligamentum nuchae, which is a large ligament that runs down the back of the neck, connecting the skull to the spinous processes of the cervical vertebrae. A line joining the nasion to the external occipital protuberance over the superior aspect of the head would indicate the position of the underlying **falx cerebri**, the **superior sagittal sinus**, and the **longitudinal cerebral fissure**, which separates the right and left cerebral hemispheres.

Vertex

The vertex is the highest point on the skull in the sagittal plane (Fig. 11.128).

Anterior Fontanelle

In the baby, the anterior fontanelle lies between the two halves of the frontal bone in front and the two parietal bones behind (Fig. 11.128). It is usually not palpable after 18 months.

Posterior Fontanelle

In the baby, the posterior fontanelle lies between the squamous part of the occipital bone and the posterior borders of the two parietal bones (Fig. 11.128). It is usually closed by the end of the first year.

Superciliary Ridges

The superciliary ridges are two prominent ridges on the frontal bones above the upper margin of the orbit (Fig. 11.128). Deep to these ridges on either side of the midline lie the **frontal air sinuses**.

Superior Nuchal Line

The superior nuchal line is a curved ridge that runs laterally from the external occipital protuberance to the mastoid process of the temporal bone. It gives attachment to the trapezius and sternocleidomastoid muscles.

Mastoid Process of the Temporal Bone

The mastoid process projects downward and forward from behind the ear (Figs. 11.128 and 11.131). It is undeveloped in the newborn child and grows only as the result of the pull of the sternocleidomastoid, as the child moves his or her head. It can be recognized as a bony projection at the end of the second year.

Auricle and External Auditory Meatus

These structures lie in front of the mastoid process (Fig. 11.27). The external auditory meatus is about 1 in. (2.5 cm) long and forms an S-shaped curve. To examine the outer surface of the tympanic membrane in the adult with an otoscope, the tube may be straightened by pulling the auricle upward and backward. In small children, the auricle is pulled straight back or downward and backward.

Tympanic Membrane

The tympanic membrane is normally pearly gray and is concave toward the meatus (Fig. 11.27). The most depressed part of the concavity is called the **umbo** and is caused by the attachment of the handle of the malleus on its medial surface.

Zygomatic Arch

The zygomatic arch extends forward in front of the ear and ends in front in the zygomatic bone (Fig. 11.128). Above the zygomatic arch is the **temporal fossa**, which is filled with the **temporalis muscle**. Attached to the lower margin of the zygomatic arch is the **masseter muscle**. Contraction of both the temporalis and masseter muscles (Fig. 11.85) can be felt by clenching the teeth.

Superficial Temporal Artery

The pulsations of the superficial temporal artery can be felt as it crosses the zygomatic arch, immediately in front of the auricle (Fig. 11.128).

Pterion

The pterion is the point where the greater wing of the sphenoid meets the anteroinferior angle of the parietal bone. Lying 1.5 in. (4 cm) above the midpoint of the zygomatic arch (Fig. 11.128), it is not marked by an eminence or a depression, but it is important because beneath it lies the **anterior branch of the middle meningeal artery**.

Above and behind the external auditory meatus, deep to the auricle, can be felt a small depression, the **suprameatal triangle** (Fig. 11.128). This is bounded behind by a line drawn vertically upward from the posterior margin of the external auditory meatus, above by the suprameatal crest of the temporal bone, and below by the external auditory meatus. The bony floor of the triangle forms the lateral wall of the **mastoid antrum**.

Temporomandibular Joint

The temporomandibular joint can be easily palpated in front of the auricle (Fig. 11.128). Note that as the mouth is opened, the head of the mandible rotates and moves forward below the tubercle of the zygomatic arch.

Anterior Border of the Ramus of the Mandible

The anterior border of the ramus can be felt deep to the masseter muscle. The coronoid process of the mandible can be felt with the gloved finger inside the mouth, and the pterygomandibular ligament can be palpated as a tense band on its medial side.

Posterior Border of the Ramus of the Mandible

The posterior border of the ramus is overlapped above by the parotid gland (Fig. 11.85), but below it is easily felt through the skin. The outer surface of the ramus of the mandible is covered by the masseter muscle and can be felt on deep palpation when this muscle is relaxed.

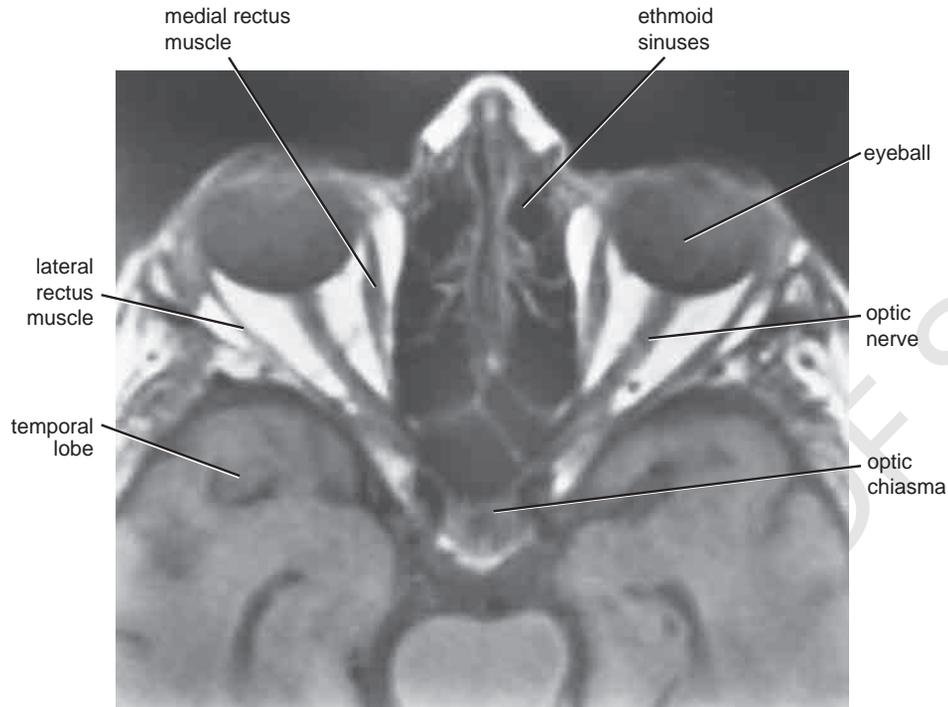


FIGURE 11.127 Axial (horizontal) MRI showing the contents of the orbital and the cranial cavities. Note that the eyeballs, the optic nerves, the optic chiasma, and the extraocular muscles can be identified.

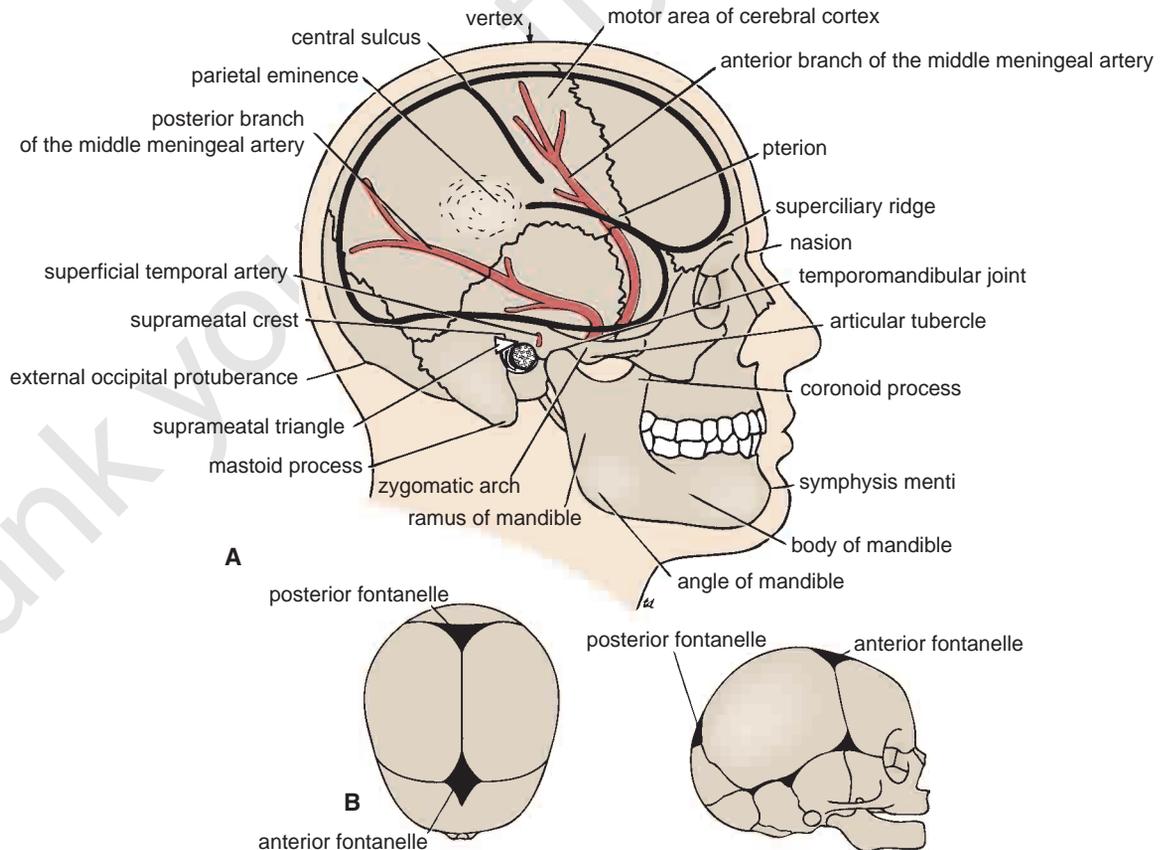


FIGURE 11.128 **A.** Right side of the head showing relations of the middle meningeal artery and the brain to the surface of the skull. **B.** Superior aspect and right side of the neonatal skull. Note the positions of the anterior and posterior fontanelles.

Body of the Mandible

The body of the mandible is best examined by having one finger inside the mouth and another on the outside. Thus, it is possible to examine the mandible from the symphysis menti, in the midline anteriorly, as far backward as the angle of the mandible (Fig. 11.128).

Facial Artery

The pulsations of the facial artery can be felt as it crosses the lower margin of the body of the mandible, at the anterior border of the masseter muscle (Fig. 11.132).

Anterior Border of the Masseter

The anterior border of the masseter can be easily felt by clenching the teeth.

Parotid Duct

The parotid duct runs forward from the parotid gland one fingerbreadth below the zygomatic arch (Fig. 11.132). It can be rolled beneath the examining finger at the anterior border of the masseter as it turns medially and opens into the mouth opposite the upper second molar tooth (Fig. 11.72).

Orbital Margin

The orbital margin is formed by the frontal, zygomatic, and maxillary bones (Fig. 11.18).

Supraorbital Notch

If present, the notch can be felt at the junction of the medial and intermediate thirds of the upper margin of the orbit. It transmits the **supraorbital nerve**, which can be rolled against the bone (Fig. 11.18).

Infraorbital Foramen

The infraorbital foramen lies 5 mm below the lower margin of the orbit (Fig. 11.1), on a line drawn downward from the supraorbital notch to the interval between the two lower premolar teeth.

Infraorbital Nerve

The infraorbital nerve emerges from the foramen and supplies the skin of the face.

Maxillary Air Sinus

The maxillary air sinus is situated within the maxillary bone and lies below the infraorbital foramen on each side (Fig. 11.97).

Frontal Air Sinus

The frontal air sinus is situated within the frontal bone and lies deep to the superciliary ridge on each side (Fig. 11.97).

Surface Landmarks of the Neck

Anterior Aspect

In the midline anteriorly, the following structures can be palpated from above downward:

- **Symphysis menti:** The lower margin can be felt where the two halves of the body of the mandible unite in the midline (Figs. 11.129 and 11.130).
- **Submental triangle:** This lies between the symphysis menti and the body of the hyoid bone (Fig. 11.56). It is bounded anteriorly by the midline of the neck, laterally by the anterior belly of the digastric muscle, and inferiorly by the body of the hyoid bone. The floor is formed by the mylohyoid muscle. The submental lymph nodes are located in this triangle.
- **Body of the hyoid bone:** This lies opposite the 3rd cervical vertebra (Figs. 11.13 and 11.129).
- **Thyrohyoid membrane:** This fills in the interval between the hyoid bone and the thyroid cartilage (Fig. 11.130).
- **Upper border of the thyroid cartilage:** This notched structure lies opposite the 4th cervical vertebra (Figs. 11.13 and 11.129).
- **Cricothyroid ligament:** This structure fills in the interval between the cricoid cartilage and the thyroid cartilage (Fig. 11.130).
- **Cricoid cartilage:** An important landmark in the neck (Fig. 11.129), this lies at the level of the 6th cervical vertebra, at the junction of the larynx with the trachea, at the level of the junction of the pharynx with the esophagus, at the level of the middle cervical sympathetic ganglion, and at the level where the inferior thyroid artery enters the thyroid gland.
- **Cricotracheal ligament:** This structure fills in the interval between the cricoid cartilage and the first ring of the trachea (Fig. 11.98).
- **First ring of the trachea:** This can be felt by gentle palpation just above the isthmus of the thyroid gland.
- **Isthmus of the thyroid gland:** This lies in front of the second, third, and fourth rings of the trachea (Figs. 11.129 and 11.130).
- **Inferior thyroid veins:** The inferior thyroid veins lie in front of the fifth, sixth, and seventh rings of the trachea (Fig. 11.110).
- **Thyroidea ima artery:** When present, this artery ascends in front of the trachea to the isthmus of the thyroid gland, from the brachiocephalic artery (Fig. 11.110).
- **Jugular arch:** This vein connects the two anterior jugular veins just above the suprasternal notch (Fig. 11.13).

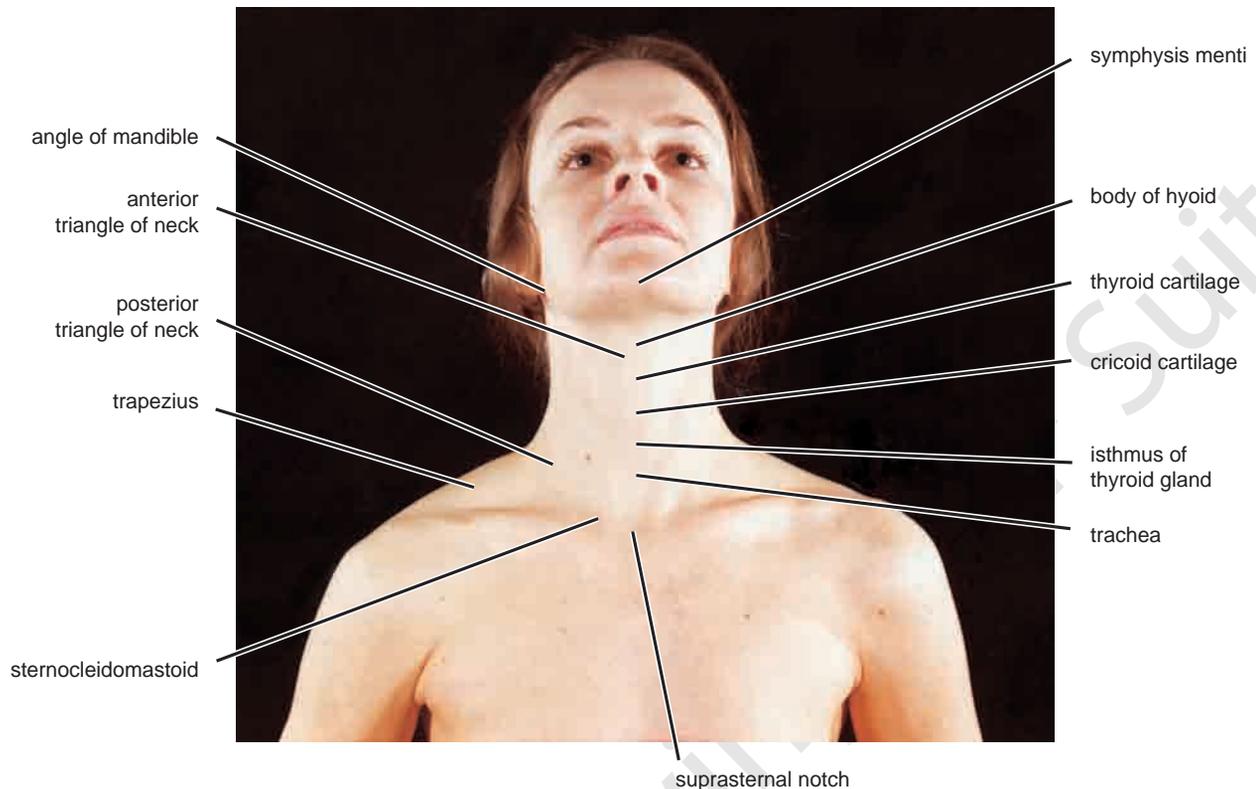


FIGURE 11.129 Anterior view of the head and neck of a 29-year-old woman. Note that the atlanto-occipital joints and the cervical part of the vertebral column are partially extended for full exposure of the front of the neck.

- **Suprasternal notch:** This can be felt between the anterior ends of the clavicles (Fig. 11.129). It is the superior border of the manubrium sterni and lies opposite the lower border of the body of the 2nd thoracic vertebra.

In the adult, the trachea may measure as much as 1 in. (2.5 cm) in diameter, whereas in a baby it may be narrower than a pencil. In young children, the thymus gland may extend above the suprasternal notch as far as the isthmus of the thyroid gland, and the brachiocephalic artery and the left brachiocephalic vein may protrude above the suprasternal notch.

Posterior Aspect

In the midline posteriorly, the following structures can be palpated from above downward.

The **external occipital protuberance** lies in the midline at the junction of the head and neck (Fig. 11.132). If the index finger is placed on the skin in the midline, it can be drawn downward in the **nuchal groove**. The first spinous process to be felt is that of the **7th cervical vertebra (vertebra prominens)**. Cervical spines one to six are covered by the **ligamentum nuchae**.

Lateral Aspect

Sternocleidomastoid Muscle

On the side of the neck, the sternocleidomastoid can be palpated throughout its length as it passes upward from the sternum and clavicle to the mastoid process (Figs. 11.131 and 11.132). The muscle can be made to stand out by asking the patient to approximate the ear to the shoulder of the same side and at the same time rotate the head so that the face looks upward toward the opposite side. If the movement is carried out against resistance, the muscle will be felt to contract, and its anterior and posterior borders will be defined.

The sternocleidomastoid divides the neck into anterior and posterior triangles. The anterior triangle of the neck is bounded by the body of the mandible, the sternocleidomastoid, and the midline (Fig. 11.56). The posterior triangle is bounded by the anterior border of the trapezius, the sternocleidomastoid, and the clavicle (Fig. 11.56).

Trapezius Muscle

The anterior border of the trapezius muscle (Fig. 11.129) can be felt by asking the patient to shrug the shoulders. It will be seen to extend from the superior nuchal line of the occipital bone, downward and forward to the posterior border of the lateral third of the clavicle.

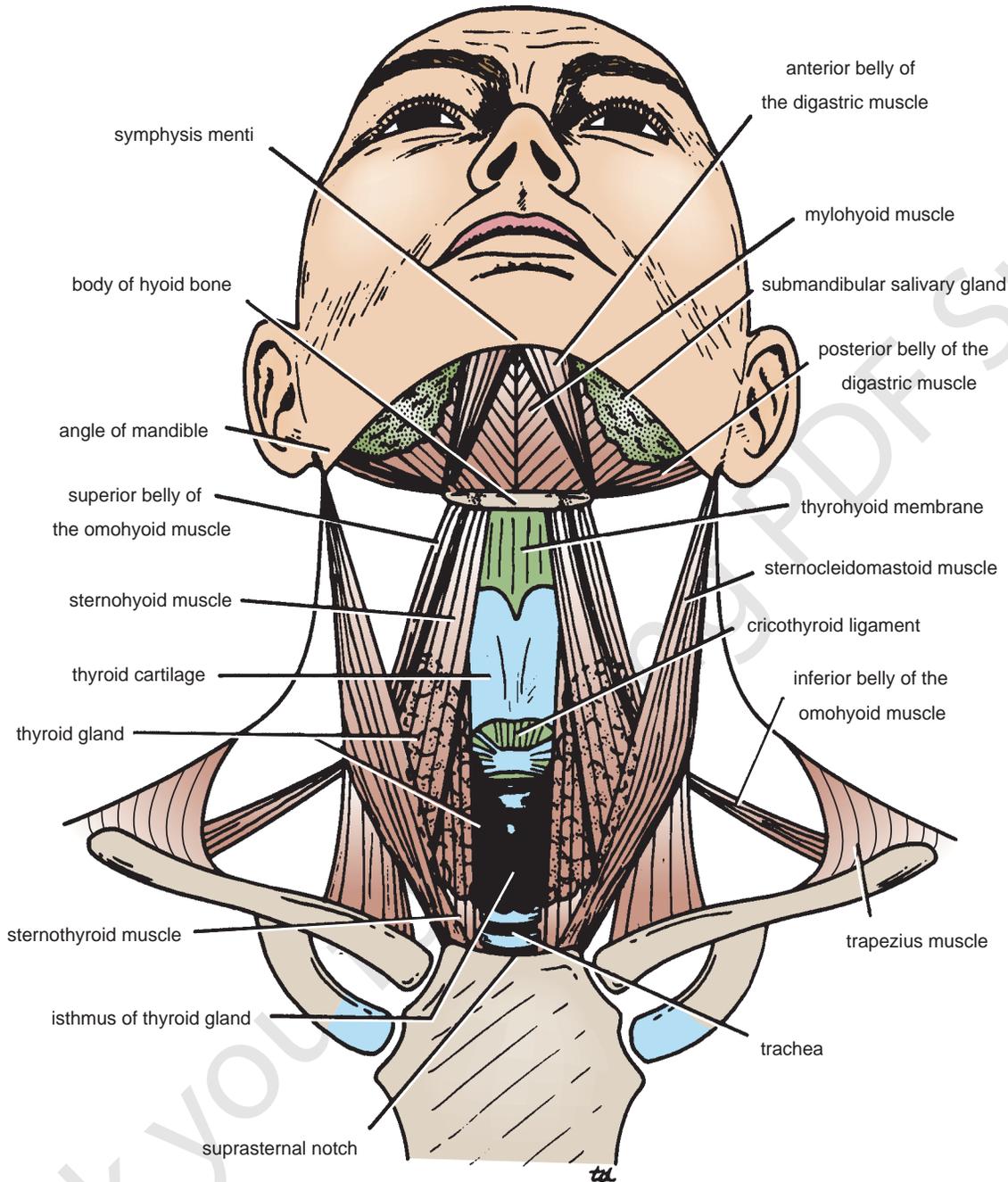


FIGURE 11.130 Surface anatomy of the neck from in front.

Platysma Muscle

The platysma can be seen as a sheet of muscle by asking the patient to clench the jaws firmly. The muscle extends from the body of the mandible downward over the clavicle onto the anterior thoracic wall (Fig. 11.51).

Root of the Neck

At the root of the neck are the **suprasternal notch** in the midline anteriorly (see page 677) and the clavicles. Each clavicle is subcutaneous throughout its entire length and can be easily palpated (Fig. 11.132). It articulates at its

lateral extremity with the acromion of the scapula. At the medial end of the clavicle, the **sternoclavicular joint** can be identified.

Anterior Triangle of the Neck

The isthmus of the thyroid gland lies in front of the second, third, and fourth rings of the trachea (Figs. 11.129 and 11.130). The lateral lobes of the thyroid gland can be palpated deep to the sternocleidomastoid muscles. This is most easily carried out by standing behind the seated patient and asking the patient to flex the neck for-

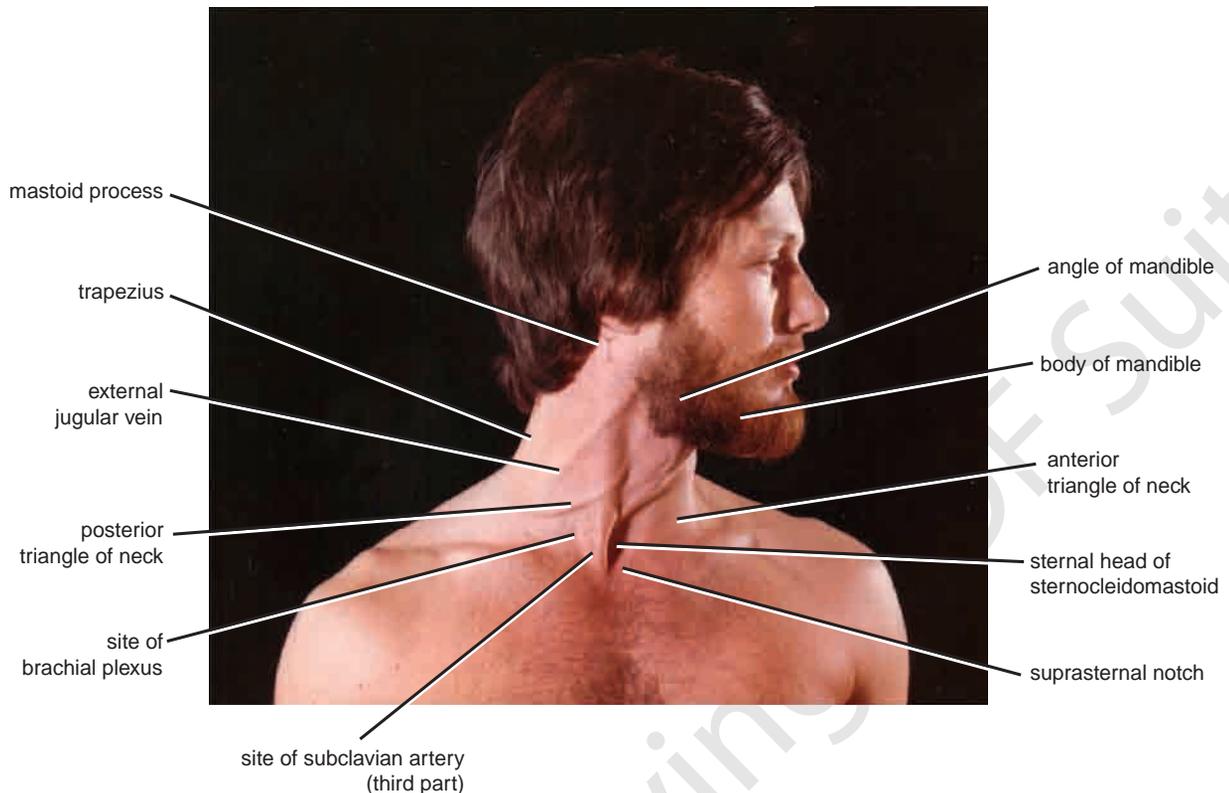


FIGURE 11.131 Anterior view of the neck of a 27-year-old man. Note that the head has been laterally rotated to the left at the atlantoaxial joints and at the joints of the cervical part of the vertebral column.

ward and so relax the overlying muscles. The observer can then examine both lobes simultaneously with the tips of the fingers of both hands.

Carotid Sheath

The carotid sheath, which contains the carotid arteries, the internal jugular vein, the vagus nerve, and the deep cervical lymph nodes, can be marked out by a line joining the sternoclavicular joint to a point midway between the tip of the mastoid process and the angle of the mandible. At the level of the upper border of the thyroid cartilage, the common carotid artery bifurcates into the internal and external carotid arteries (Fig. 11.132). The pulsations of these arteries can be felt at this level.

Posterior Triangle of the Neck

At the posterior triangle of the neck, the spinal part of the **accessory nerve** is relatively superficial as it emerges from the posterior border of the sternocleidomastoid and runs downward and backward to pass beneath the anterior border of the trapezius (Fig. 11.132). The course of this nerve may be indicated as follows: Draw a line from the angle of the mandible to the tip of the mastoid process. Bisect this line at right angles and extend the second line downward across the posterior triangle; the second line indicates the course of the nerve.

Roots and Trunks of the Brachial Plexus

The roots and trunks of the brachial plexus occupy the lower anterior angle of the posterior triangle (Figs. 11.131

and 11.132). The upper limit of the plexus can be indicated by a line drawn from the cricoid cartilage downward to the middle of the clavicle.

Third Part of the Subclavian Artery

The third part of the subclavian artery also occupies the lower anterior angle of the posterior triangle (Figs. 11.131 and 11.132). Its course may be indicated by a curved line, which passes upward from the sternoclavicular joint for about 0.5 in. (1.3 cm) and then downward to the middle of the clavicle. It is here, where the artery lies on the upper surface of the 1st rib, that its pulsations can be felt easily. The subclavian vein lies behind the clavicle and does not enter the neck.

External Jugular Vein

The external jugular vein lies in the superficial fascia deep to the platysma. It passes downward from the region of the angle of the mandible to the middle of the clavicle (Figs. 11.131 and 11.132). It perforates the deep fascia just above the clavicle and drains into the subclavian vein.

Salivary Glands

The three large salivary glands can be palpated. The parotid gland lies below the ear in the interval between the mandible and the anterior border of the sternocleidomastoid muscle (Fig. 11.85). The surface marking of the parotid duct is given on page 631.

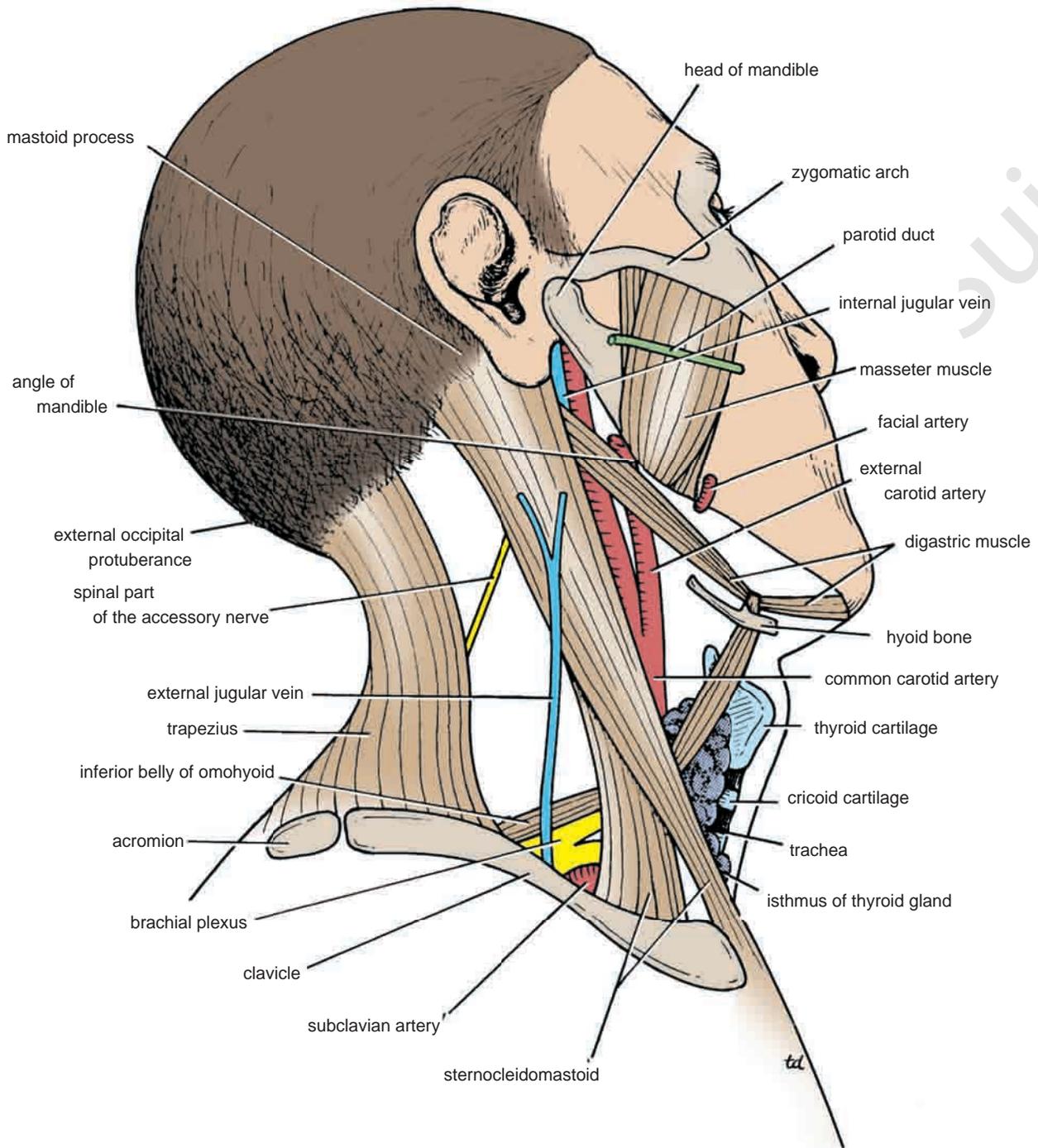


FIGURE 11.132 Surface anatomy of the neck from the lateral aspect.

The submandibular gland can be divided into superficial and deep parts. The superficial part lies beneath the lower margin of the body of the mandible (Fig. 11.86). The deep part of the submandibular gland, the submandibular duct, and the sublingual gland can be palpated through the mucous membrane covering the floor of the mouth in the interval between the tongue and the lower jaw. The submandibular duct opens into the mouth on the side of the frenulum of the tongue (Fig. 11.72).



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