

Human Anatomy

Lec.1

Dr Ban Alwash

The Scalp

The scalp consists of five layers, the first three of which are bound together and move as a whole on the skull. The first letter of each layer combines to spell the acronym Scalp.

These layers are:

Skin: This is thick and hair bearing and contains numerous sebaceous glands.

Connective tissue beneath the skin. This is a dense fibrofatty layer containing fibrous septa that unite the skin to the underlying epicranial aponeurosis. This layer contains numerous **blood vessels**. The arteries are derived from both the external and internal carotid arteries, and free anastomoses occur between them. **(Fig. 1).**

Aponeurosis (epicranial): This is a thin, tendinous sheet that unites the occipital and frontal bellies of the occipitofrontalis muscle **(Figs. 1 & 2)**. The lateral margins of the aponeurosis are attached to the temporal fascia.

Loose areolar tissue: This occupies the subaponeurotic space and loosely connects the epicranial aponeurosis to the periosteum of the skull (the pericranium) (Fig. 1). This is the plane of movement of the scalp, that is, when the scalp moves, the first three layers (SCA) slide along this layer relative to the underlying periosteum. The areolar tissue contains a few small arteries, but it also contains some important **emissary veins**. The emissary veins are valveless and connect the superficial veins of the scalp with the diploic veins of the skull bones and with the intracranial venous sinuses **(Fig. 1).**

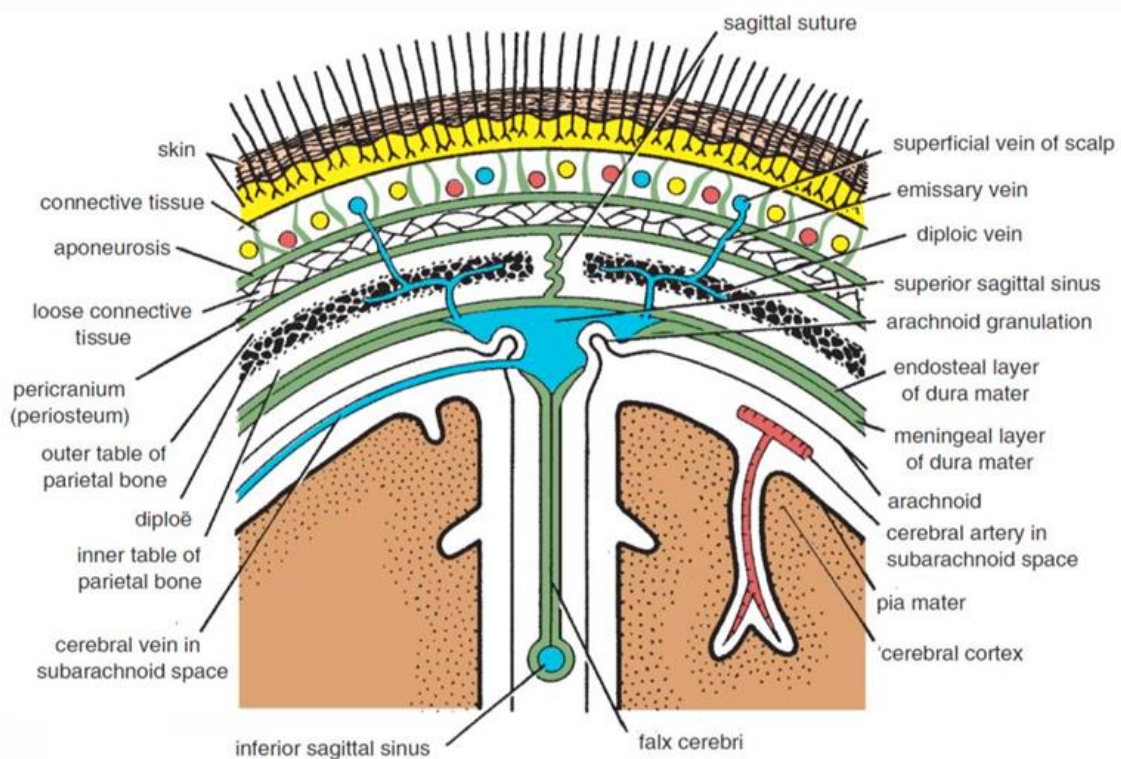


Fig 1: Coronal section of the upper part of the head showing the layers of the scalp.

Pericranium: The pericranium is the periosteum covering the outer surface of the skull bones. The pericranium is continuous with the periosteum on the inner surface of the skull bones (endosteum) at the sutures between the individual skull bones.

Scalp Occipitofrontalis muscle: The origin, insertion, nerve supply, and action of this muscle are described in the following Table. Note that when this muscle contracts, the first three layers of the scalp move forward or backward, the loose areolar tissue of the fourth layer of the scalp allowing the aponeurosis to move on the pericranium. The frontal bellies of the occipitofrontalis can raise the eyebrows in expressions of surprise or horror (2).

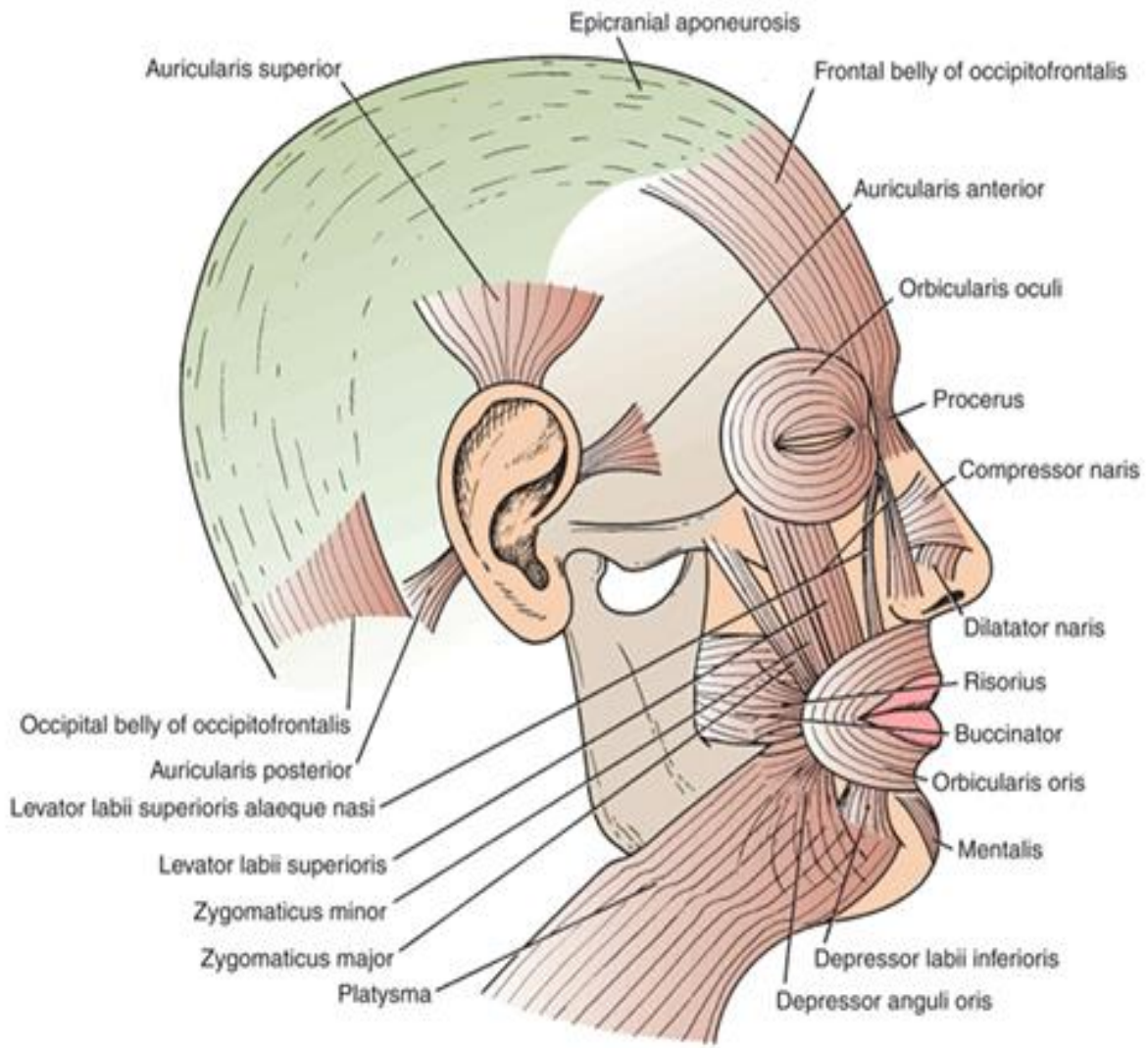


Fig 2: Muscles of the scalp and of facial expression

Sensory Nerve Supply of the Scalp

The main trunks of the sensory nerves lie in the dense connective tissue layer of the scalp (Fig.3).

Trigeminal branches:

- **The supratrochlear nerve:** a branch of the ophthalmic division of the trigeminal nerve, winds around the superior orbital margin and supplies the scalp. It passes backward close to the median plane and reaches nearly as far as the vertex of the skull.
- **The supraorbital nerve:** a branch of the ophthalmic division of the trigeminal nerve, winds around the superior orbital margin and ascends over the forehead. It supplies the scalp as far backward as the vertex.
- **The zygomaticotemporal nerve:** a branch of the maxillary division of the trigeminal nerve, supplies the scalp over the temple.
- **The auriculotemporal nerve:** a branch of the mandibular division of the trigeminal nerve, ascends over the side of the head from in front of the auricle. Its terminal branches supply the skin over the temporal region (Fig.3).

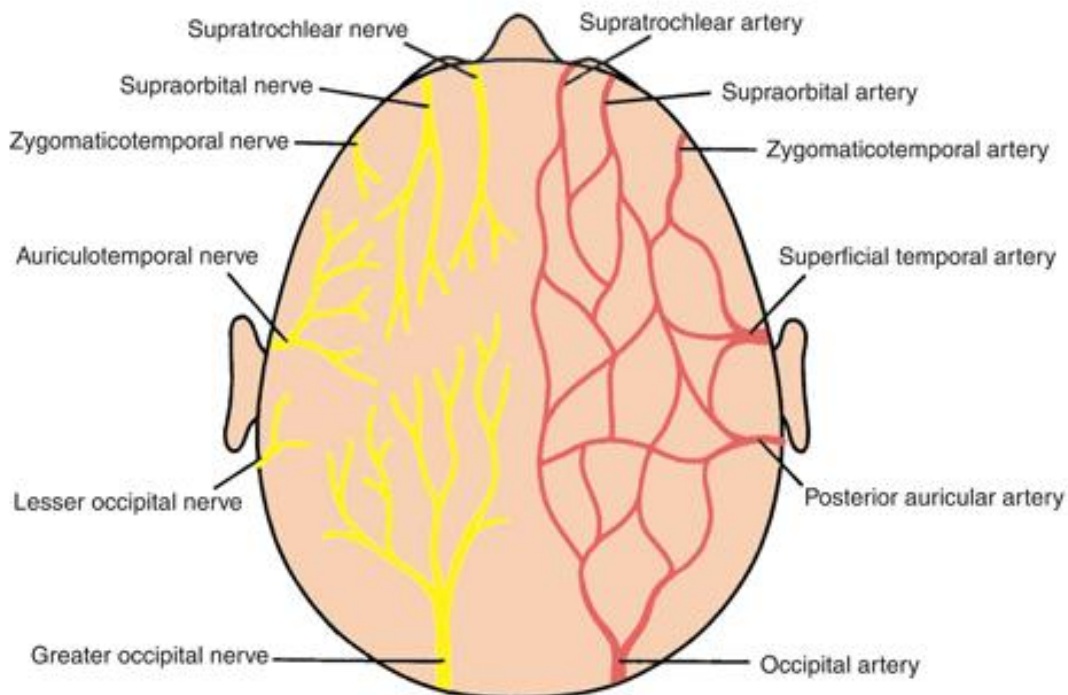


Fig 3: Superior view of the sensory nerve supply and arterial supply to the scalp

Cervical spinal nerve branches:

Ventral Remi:

- **The Great auricular nerve:** a branch of ventral rami the second cervical nerve that supply the skin Infront of the auricle.
- **The lesser occipital nerve (C2):** a branch of the cervical plexus, ascends along the posterior edge of the sternocleidomastoid muscle and supplies the scalp over the lateral part of the occipital region and the skin over the medial surface of the auricle.

Dorsal Remi:

- **The greater occipital nerve (C2):** a branch of dorsal rami of the second cervical nerve, ascends over the back of the scalp and supplies the skin at forward of the vertex of the skull.
- **Third occipital nerve (C3):** a branch of dorsal rami of the third cervical nerve, ascends over the back of the scalp and supplies the skin at the back of the skull.

Motor Nerves to occipitofrontalis muscle

Facial Nerve

- Temporal branch: supplies frontal bellies
- Posterior auricular branch: supplies occipital bellies

Arterial Supply of the Scalp:

The scalp has a rich supply of blood to nourish the hair follicles; for this reason, the smallest cut bleeds profusely. The arteries lie in the superficial fascia (Fig 3.)

- **The supratrochlear and the supraorbital arteries:**branches of the ophthalmic artery, ascend over the forehead in company with the supratrochlear and supraorbital nerves.
- **The superficial temporal artery:** a branch of the external carotid artery, ascends in front of the auricle in company with the auriculotemporal nerve. It divides into anterior and posterior branches, which supply the skin over the frontal and temporal regions.

- **The posterior auricular artery:** a branch of the external carotid artery, ascends behind the auricle to supply the scalp above and behind the auricle.
- **The occipital artery:** a branch of the external carotid artery, ascends in company with the greater occipital nerve. It supplies the skin over the back of the scalp and reaches as high as the vertex of the skull.

Veinous Drainage of the Scalp

The **supratrochlear** and **supraorbital veins** unite at the medial margin of the orbit to form the **facial vein**. The **superficial temporal vein unites with the maxillary vein** in the substance of the parotid gland to form the **retromandibular vein** (Fig. 4). The **posterior auricular vein** unites with the posterior division of the **retromandibular vein**, just below the parotid gland, to form the **external jugular vein** (Fig. 4). The occipital vein drains into the suboccipital venous plexus,

which in turn drains into the vertebral veins or the internal jugular vein.

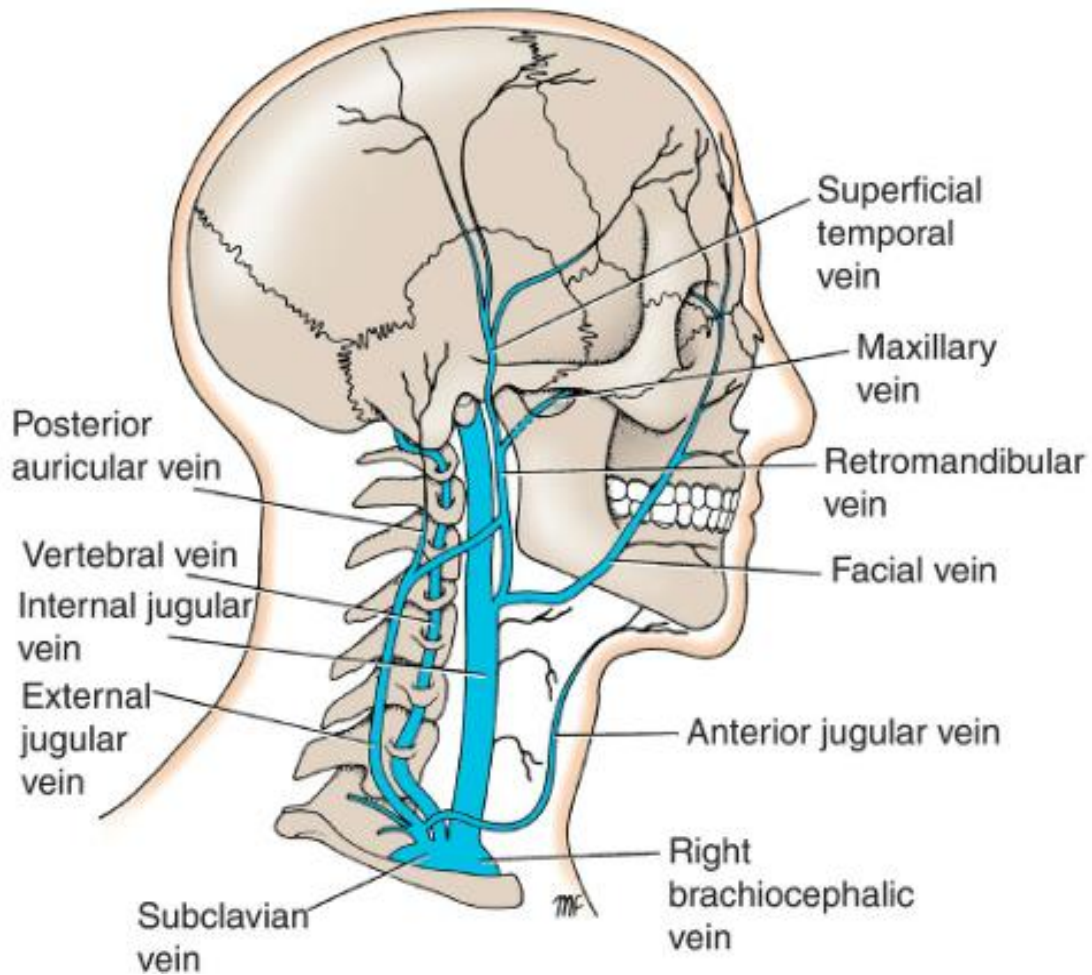


Fig 4: Main veins of the head and neck

Lymph Drainage of the Scalp

Lymph vessels in the anterior part of the scalp and forehead drain into the submandibular lymph nodes (Fig. 5). Drainage from the lateral part of the scalp above the ear is into the superficial parotid (preauricular) nodes; lymph vessels in the part of the scalp above and behind the ear drain into the mastoid nodes. Vessels in the back of the scalp drain into the occipital nodes.

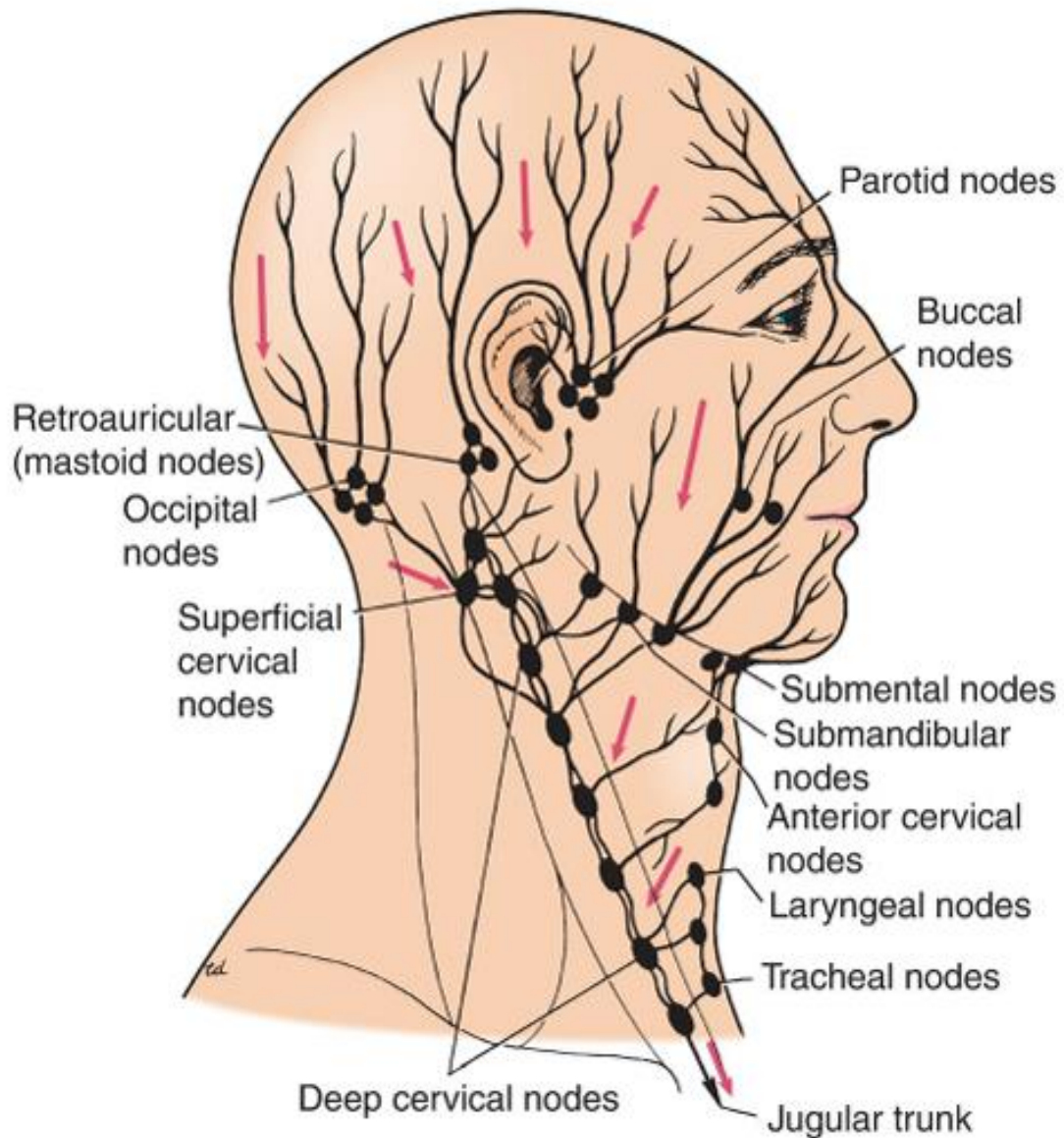


Fig 5: Lymph drainage of the head

🚑 Clinical Notes

The skin of the scalp possesses numerous sebaceous glands, the ducts of which are prone to infection and damage by combs. For this reason, sebaceous cysts of the scalp are common. Even a small laceration of the scalp can cause severe blood loss. It is often difficult to stop the bleeding of a scalp wound because the arterial walls are attached to fibrous septa in the subcutaneous tissue

and are unable to contract or retract to allow blood clotting to take place. Local pressure applied to the scalp is the only satisfactory method of stopping the bleeding.

Reference 1. Snell RS: Clinical anatomy by regions. Lippincott Williams & Wilkins, 2011.