

Scalp

Competency

AN27.1: Describe the layers of scalp, its blood supply, its nerve supply and surgical importance.

Definition: Soft tissue over vault

Extent: a. Hair bearing area

- b. Anteroposteriorly: Supraorbital margin to superior nuchal line.
Side to side: Between two zygomatic arches.

Layers (Fig. 5.1)

Named from superficial to deep:

S: Skin. It is hairy skin with proportional sebaceous glands.

C: Connective tissue. It is dense and forms neurovascular plane.

A: Aponeurosis (galea aponeurotica/epicranial aponeurosis) (**Figs 5.2 and 5.3**)

This connects the occipital and frontal bellies of occipitofrontalis muscle. The former is attached to highest nuchal line of occipital bone while latter intermingles anteriorly with orbicularis oculi.

L: Loose areolar tissue

P: Pericranium. It is periosteum of the outer surface of skull cap.

It fuses with the sutures between adjacent flat bones.

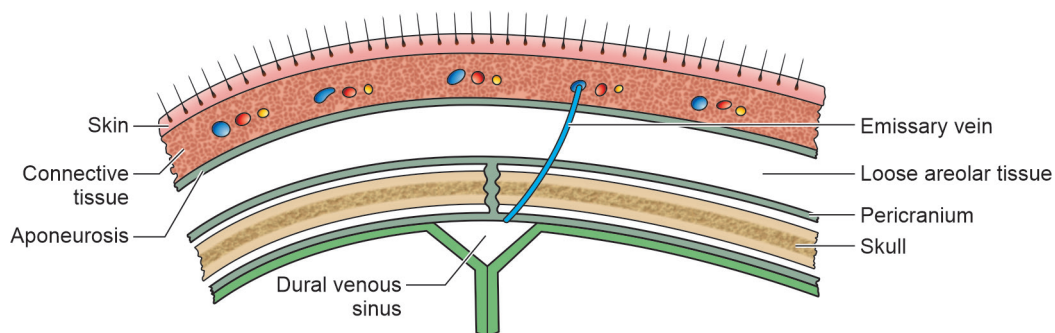


Fig. 5.1: Scalp: Coronal sectional view

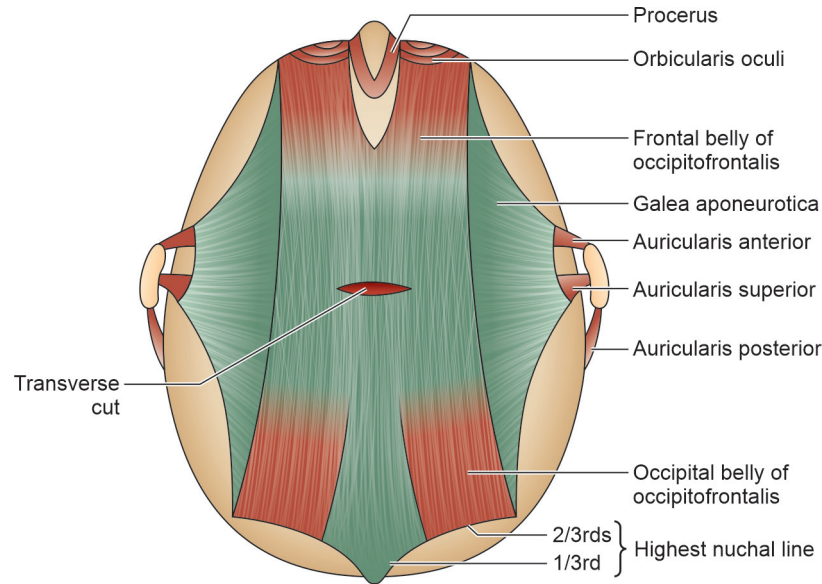


Fig. 5.2: Occipitofrontalis: Superior view

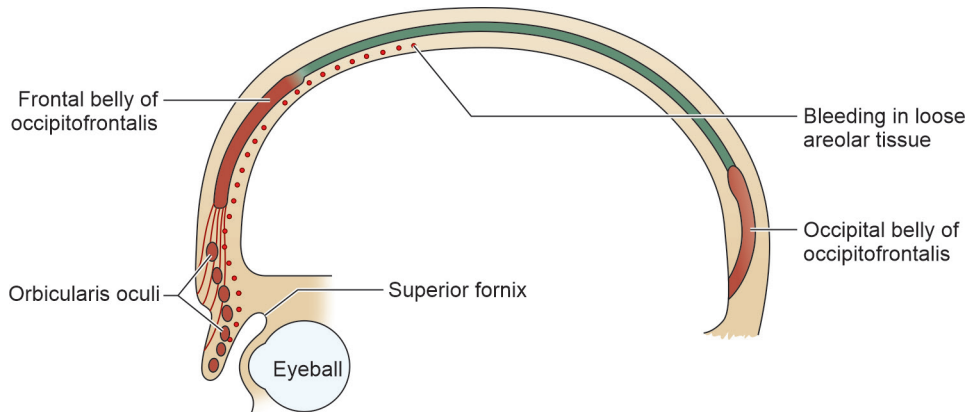


Fig. 5.3: Occipitofrontalis: Sagittal sectional view

APPLIED ANATOMY

- Scalp is a common site of sebaceous cyst.
- Walls of the vessels fuse with the surrounding dense connective tissue which prevents them from constricting when damaged. This leads to profuse bleeding (**Fig. 5.4**).
- Series of haemostats are applied and edges of damaged skin are everted preferably to prevent the bleeding (**Fig. 5.5**).
- Inflammations in the plane of dense connective tissue produce little swelling but are very painful due to compression of nerves.
- Caput succedaneum is due to oedema in the plane of dense connective tissue of newborn during difficult labour.

- First three layers of scalp fuse together and therefore stitched together by surgeons who consider them as first surgical layer.
- Inflammation in the loose areolar tissue can easily involve emissary veins, damaged during operation, which can carry infection to intracranial venous sinuses. Layer of loose areolar tissue is therefore called surgical dangerous area or danger area of scalp.
- A transverse cut, deep enough to involve galea aponeurotica, gapes.
- Bleeding in loose areolar tissue leads to black eye (darkened upper lid) as the blood follows frontal belly of occipitofrontalis to reach the upper lid (**Fig. 5.6**).
- Accidental tearing down of scalp usually involves a very large flap.
- If the bleeding takes place deep to pericranium (cephalohematoma), the swelling corresponds with the shape of skull bone as the pericranium fuses with the sutures along its margins.
- Since there is little regenerating capacity due to lack of cambium layer in periosteum, necrosed bone leaves a gap.

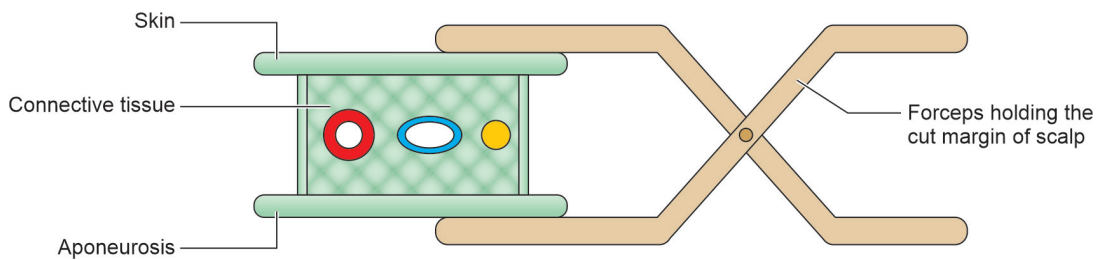


Fig. 5.4: Neurovascular plane of scalp

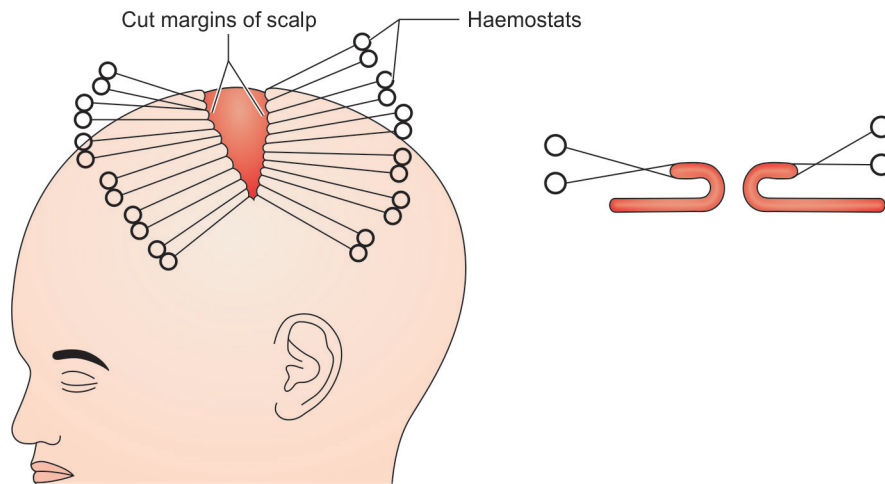


Fig. 5.5: To arrest the bleeding of scalp

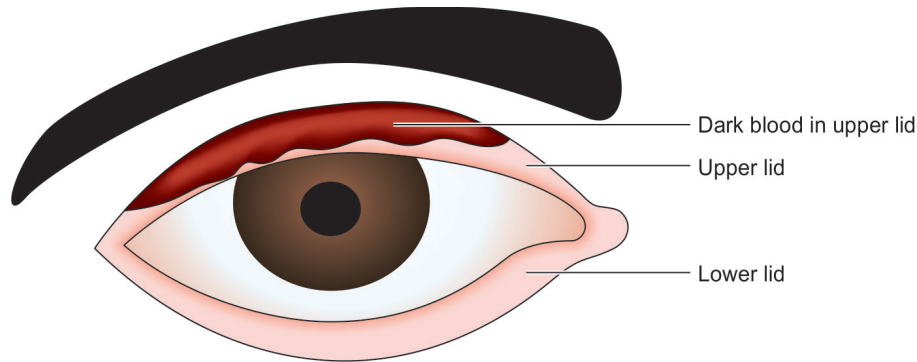


Fig. 5.6: Black eye

NERVES SUPPLYING THE SCALP (Figs 5.7 and 5.8)

- A. **Motor nerves:** Following two branches appear from facial nerve for scalp.
- Temporal branch: Ascends in front of auricle and supplies frontal belly.
 - Postauricular branch: Ascends behind the auricle and supplies occipital belly of occipitofrontalis.
- B. **Sensory nerves** (from anterior to posterior)
- Branches from ophthalmic nerve
 - Supratrochlear nerve: Supplies forehead near midline.
 - Supraorbital nerve: Passes through supraorbital notch.
 - Branch of maxillary nerve

Zygomaticotemporal nerve: Appears in the temporal fossa region.
 - Branch of mandibular nerve

Auriculotemporal nerve: Ascends in front of auricle.
 - Branches from ventral rami of cervical nerves (cervical plexus)
 - Great auricular nerve ($C_{2,3}$): Ascends just behind the auricle.
 - Lesser occipital nerve (C_2)
 - Branches from dorsal rami of cervical nerves
 - Greater occipital nerve (C_2)
 - Third occipital nerve (C_3)

Mnemonics

Super Star Zoya Akhtar (nerves of scalp in front of auricle)

S: Supratrochlear nerve; S: Supraorbital nerve; Z: Zygomaticotemporal nerve; A: Auriculotemporal nerve

Girls Like Getting Toys (nerves of scalp behind the auricle)

G: Great auricular nerve; L: Lesser occipital nerve; G: Greater occipital nerve; T: Third occipital nerve

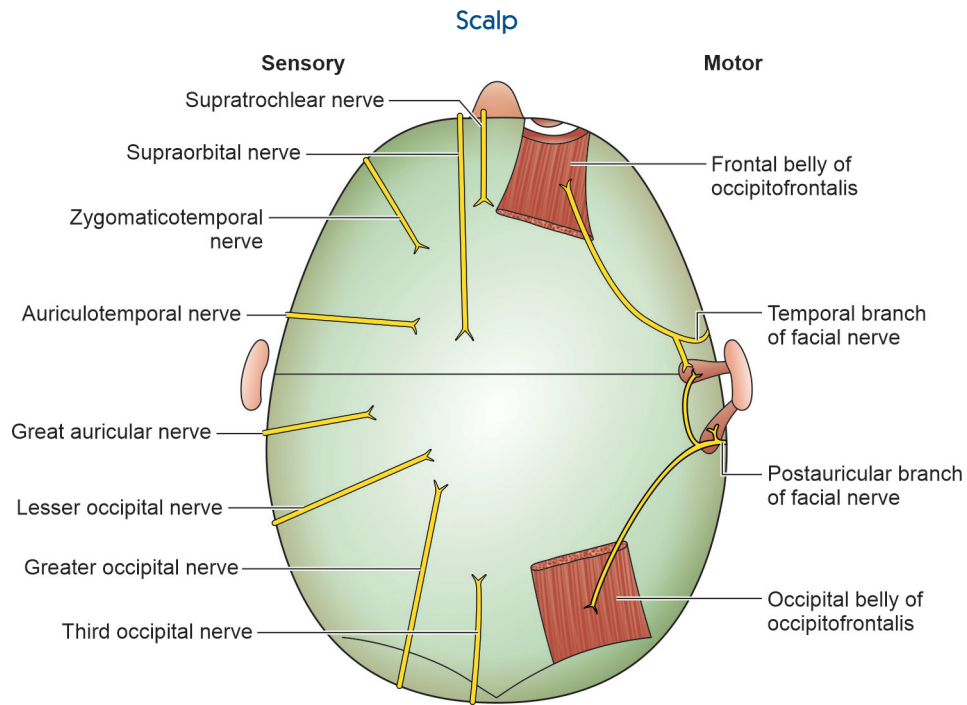


Fig. 5.7: Nerves of scalp

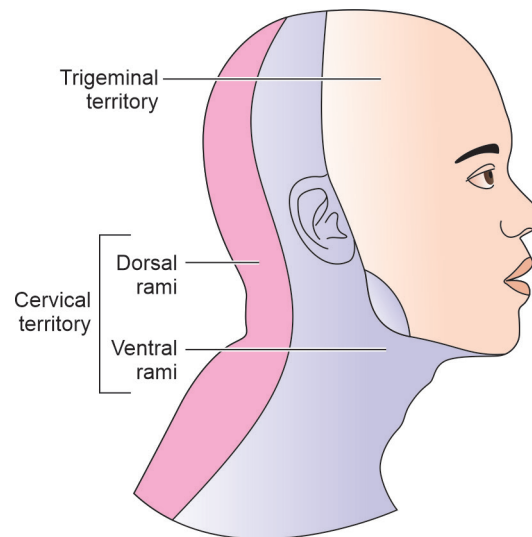


Fig. 5.8: Trigeminal and cervical territories in the head and neck region

APPLIED ANATOMY

- Temporal branch of facial nerve should be saved during operations as it crosses midpoint of zygomatic arch.
- To secure rich innervation during operations on scalp, flap should be made with broad base.

ARTERIES SUPPLYING SCALP (Fig. 5.9)

From anterior to posterior, these are

- a. Branches from ophthalmic artery of internal carotid artery
 1. Supratrochlear artery
 2. Supraorbital artery: It passes through supraorbital notch
- b. Branches from external carotid artery
 1. Superficial temporal artery: Ascends in front of auricle
 2. Posterior auricular artery: Ascends behind the auricle
 3. Occipital artery: Passes through occipital groove to enter the occipital region.

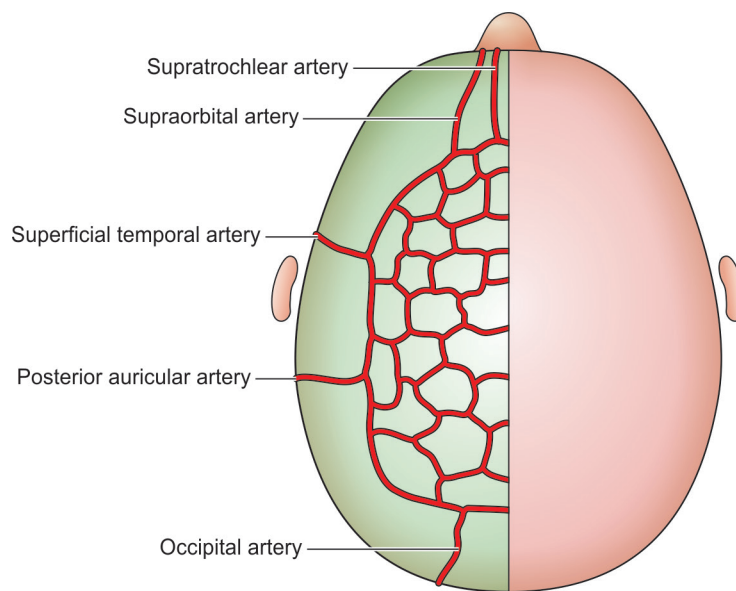


Fig. 5.9: Arteries of scalp

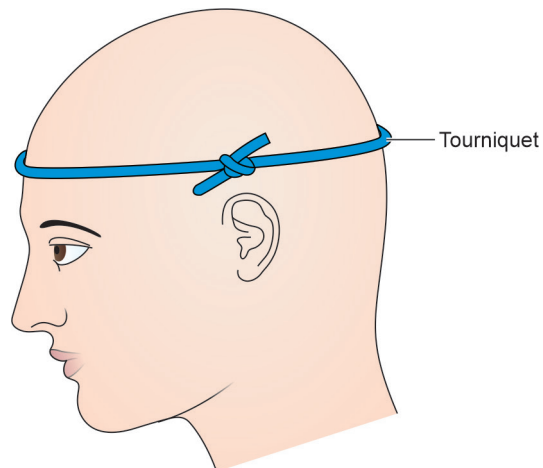


Fig. 5.10: Tourniquet around head to stop bleeding

APPLIED ANATOMY

- Rich vascularity is responsible for quick healing of wounds.
- Arteries converge to vertex from all the sides and therefore, to arrest the bleeding, one should apply tourniquet around the head (**Fig. 5.10**).
- Due to extensive anastomosis, an avulsed part of the scalp is maintained even with a narrow pedicle.
- During operation, flap with broad base is preferred to avoid damage of arteries.

VEINS OF SCALP (Figs 5.11 and 5.12)

Veins accompany arteries of same name and therefore from anterior to posterior, these are:

1. Supratrochlear vein.
2. Supraorbital vein (supraorbital nerve and not the vein, passes through supraorbital notch)
3. Superficial temporal vein
4. Posterior auricular vein
5. Occipital vein.

Drainage of Veins of Scalp (correlate names with the numbers above)

(1) + (2) = Angular vein (6) → Facial vein (7). (3) + Maxillary vein = Retromandibular vein (after formation behind the neck, it descends behind the ramus of mandible). Retromandibular vein divides into anterior division (8) and posterior division (9).

(7) + (8) = Common facial vein → Internal jugular vein

(4) + (9) = External jugular vein → Subclavian vein

(5) drains into suboccipital venous plexus.

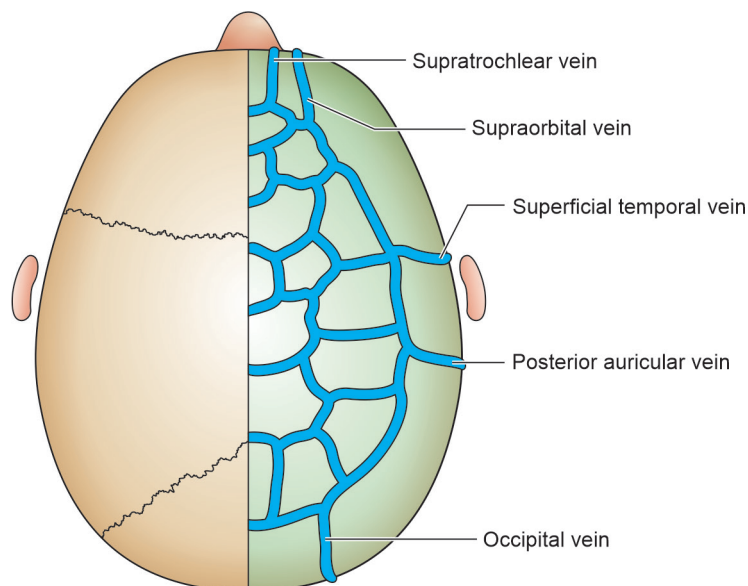


Fig. 5.11: Veins of scalp

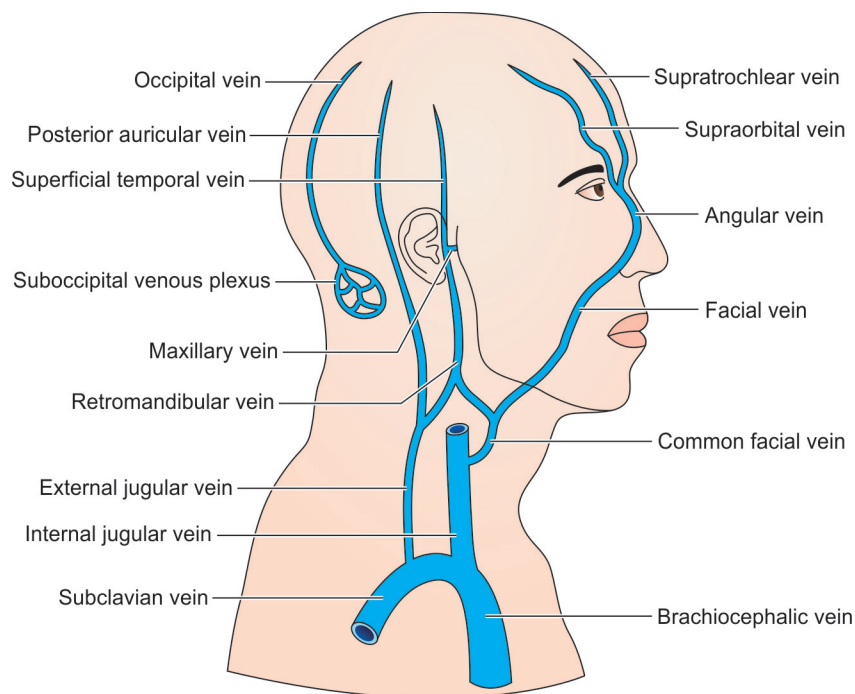


Fig. 5.12: Course and drainage of veins of scalp

Competency

AN27.2: Describe emissary veins with its role in the spread of infection from extracranial route to intracranial venous sinuses.

APPLIED ANATOMY

- **Emissary veins.** These are veins which connect veins of scalp with intracranial venous sinuses. One through parietal foramen is called vein of Santorini. Infection of scalp may take these routes to involve intracranial venous sinuses.
- **Diploic veins.** These are veins located in the plane of spongy bone (diploe) of flat bones of skull. Tunnels for diploic veins in the parietal region are visible in X-ray (parietal diploic spider) which should not be mistaken for fracture.

LYMPHATIC DRAINAGE OF SCALP (Fig. 5.13)

Lymph nodes draining the scalp: Anterior part of scalp is drained by preauricular lymph nodes (parotid lymph nodes). Posterior part of scalp is drained by postauricular lymph nodes (mastoid lymph nodes) and occipital lymph nodes.

APPLIED ANATOMY

Infection and malignancy in the scalp may spread through lymphatics and involve lymph nodes.

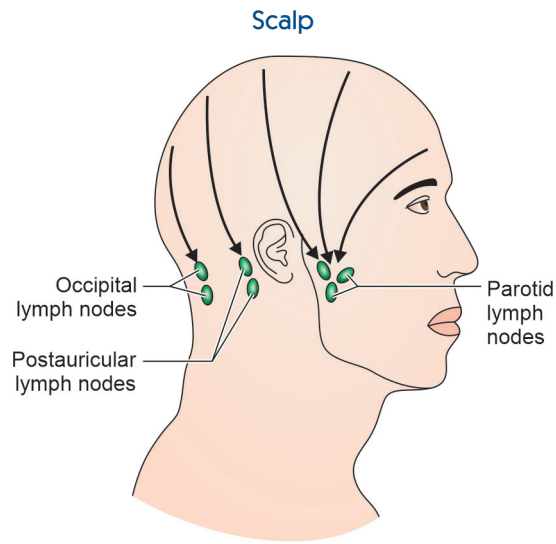


Fig. 5.13: Lymphatic drainage of scalp



Multiple Choice Questions

Select the Best Response

1. **All the following nerves supply scalp, except:**

A. Auriculotemporal nerve	B. Zygomaticotemporal nerve
C. Greater occipital nerve	D. Infraorbital nerve
2. **Neurovascular plane in scalp is:**

A. Skin	B. Dense connective tissue layer
C. Loose areolar tissue layer	D. Subpericranial plane
3. **Caput succedaneum is due to edema in the plane of:**

A. Skin	B. Dense connective tissue
C. Loose areolar tissue	D. Subpericranial space
4. **Cephalohematoma is due to bleeding in scalp in the plane of:**

A. Skin	B. Dense connective tissue
C. Loose connective tissue	D. Subpericranial space

Answers

1. D 2. B 3. B 4. D