

Blood supply of head & neck

Blood vessels (Arteries, Capillaries, and Veins): Arteries are tubes that convey blood from the heart to the tissues at high pressure. The largest artery is elastic aorta (2.5 cm in diameter) gives rise a number of branches which becoming successively narrower (more muscles and less elastic tissue in their walls) till they form arterioles (less than 0.1 mm in diameter) which transmit blood into capillaries (entirely muscular).

In many tissues, smaller arteries unite with one another forming tubular loops called **Anastomosis**. This anastomosis is important in maintaining the circulation when one of the arteries is blocked, collateral circulation occurs.

Anatomical End Arteries: Are vessels whose terminal branches **do not** anastomose with branches of arteries supplying adjacent areas, therefore, tissue is dead when such artery is blocked e.g. Retinal artery.

Functional End Arteries: Are vessels whose terminal branches **do** anastomose with those of adjacent arteries, but the caliber of the anastomosis is insufficient to keep the tissue alive should one of the arteries become occluded e.g. Coronary arteries.

Veins are vessels that transport blood back to the heart, many of them possess valves.

Venules are smaller veins. **Venous plexuses** are union of small veins (tributaries) which join with other to form larger veins and then union of them lead to formation of these plexuses. The more sluggish flow of blood in veins is aided:

1. By compression from contracting muscles surrounding them.
2. By fall in thorax pressure with each inspiration, which draws venous blood into thorax as well, as air.
3. Presence of valves in the veins prevents any backward flow of blood.

Arteries of the scalp and superficial temporal region:

The forehead receives the supraorbital, and supratrochlear branches of ophthalmic branch of internal carotid artery.

From external carotid artery:

Superficial temporal artery that is large terminal branch of external carotid artery. It divides into the anterior and posterior branches.

Transverse facial artery runs forwards on the masseter muscle, below the zygomatic arch.

Middle temporal artery crosses the root of the zygomatic arch.

Zygomatocorbital artery runs anteriorly above the zygomatic arch. It anastomoses with branches of ophthalmic artery.

Posterior auricular artery is a small artery runs with posterior auricular nerve.

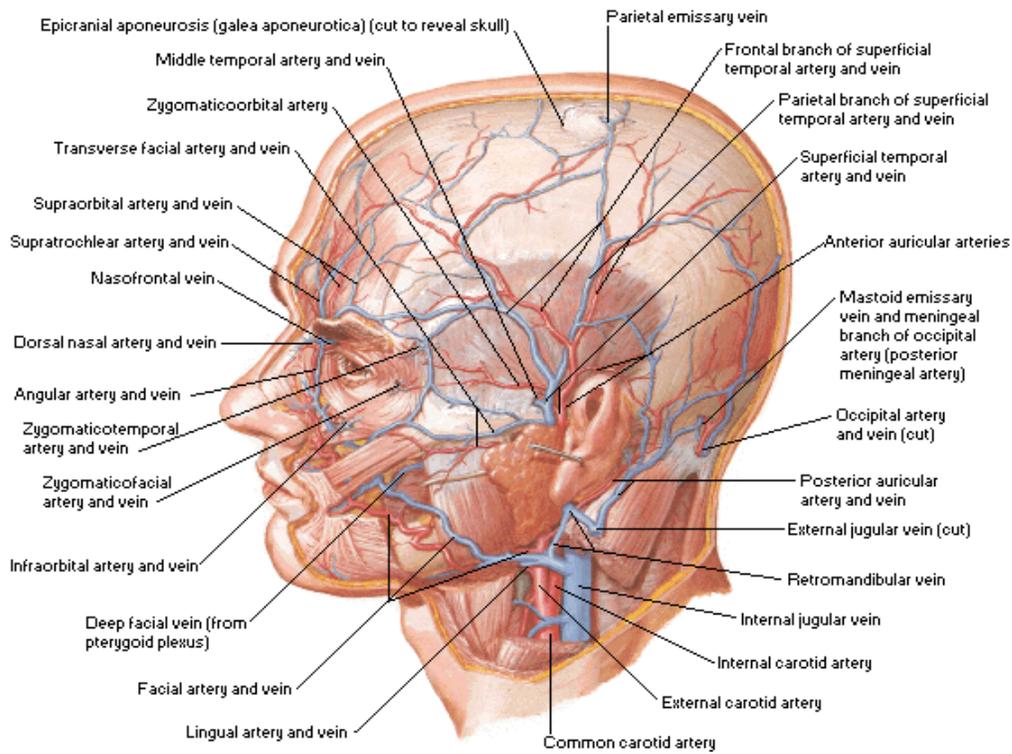
Occipital artery is a large branch arises deep to the angle of the mandible. It supplies muscles of the neck and the back of the head. Arteries of the scalp anastomose freely with each other and with those of opposite side; therefore wounds of the scalp **bleed profusely and heal quickly**.

Veins of the scalp and superficial temporal region:

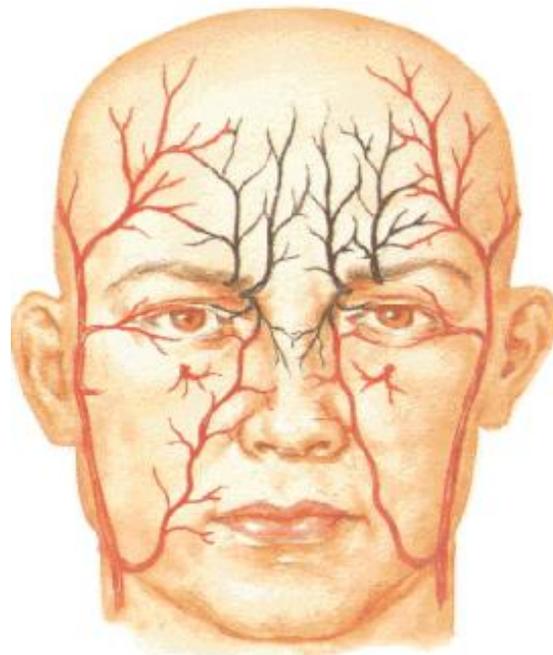
Supratrochlear and **supraorbital** veins unite at the medial angle of the eye to form **facial** vein and communicate with the orbital veins.

Superficial temporal vein joins the **middle temporal** vein at the root of the zygomatic arch to form **retromandibular** vein, which descends through parotid gland and is joined by **Transverse facial** and **maxillary** veins. Inferiorly, it divides into **anterior branch**, which unite the facial vein to form **internal jugular vein**, while **posterior branch** unite **posterior auricular** vein to form **external jugular vein** on the surface of sternocleidomastoid muscle. **Occipital** veins run with the artery in the scalp but leave it to join the **suboccipital venous plexus** then to the **vertebral** veins. This plexus is situated at the back of the neck.

Emissary veins are small veins that connect this system of veins with the venous sinuses inside the cranium. Usually one passes through each parietal foramen to the superior sagittal sinus, another through each mastoid foramen to the corresponding sigmoid sinus. This may lead to spread of infection.



Superficial arteries and veins of the scalp and face.



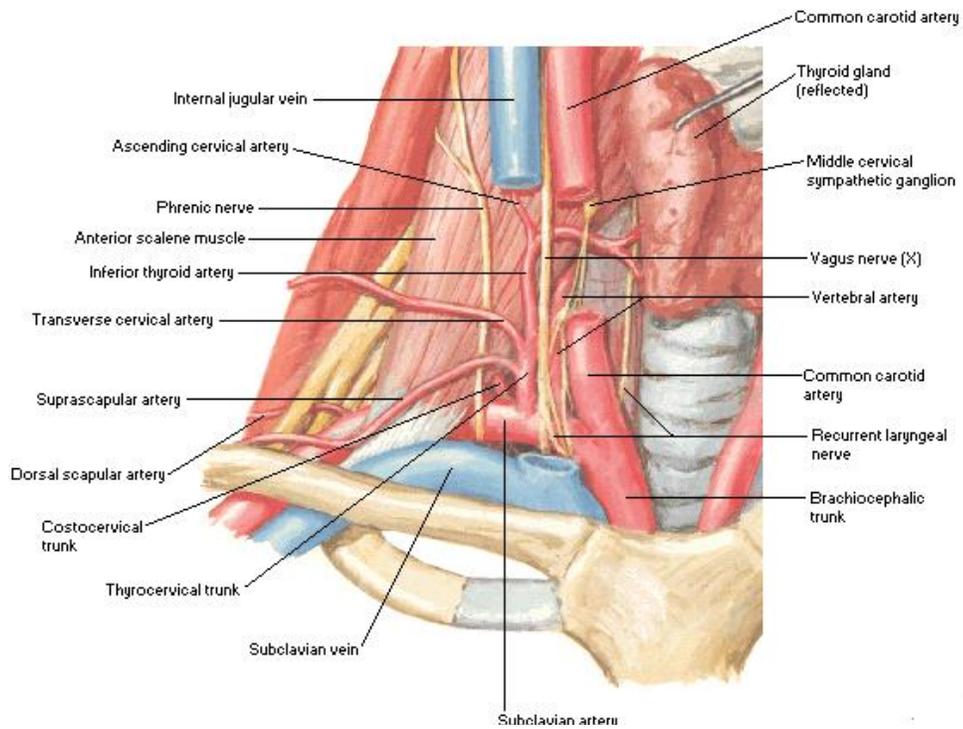
Black: from internal carotid artery (via ophthalmic artery)

Red: from external carotid artery

Superficial face. Sources of arterial supply.

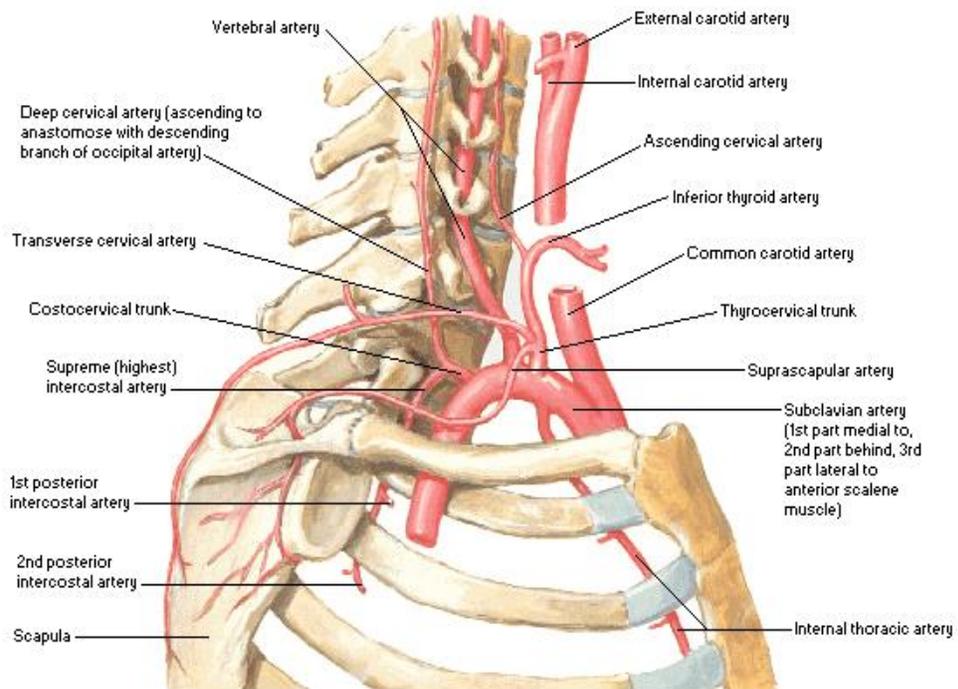
The **subclavian artery, which** is located behind scalenus anterior muscle. For descriptive purpose, this artery subdivided into three parts:

1. **Medial to scalenus anterior** muscle and gives:
 - A. **Internal thoracic artery** enters the thorax to supply the diaphragm, anterior intercostals and arterial abdominal wall. It ends as **superior epigastric** and **musculophrenic** arteries.
 - B. **Vertebral artery:** It gives, in the neck region, many spinal branches. Inside the cranium, it gives small branches and **posterior inferior cerebeller artery** to supply part of cerebellum and medulla oblongata.
 - C. **Thyrocervical trunk:** Gives
 - ***inferior thyroid** artery to the thyroid gland.
 - ***Suprascapular** artery to the scapular region.
 - ***Transverse cervical** artery to the anterior border of the trapezius muscle.
 - ***Ascending cervical** artery passes upward to the prevertebral muscles and spinal branches to the vertebral canal along the spinal nerves.
 - ***Inferior laryngeal** artery to supply the larynx that runs with recurrent laryngeal nerve.
2. **Costocervical trunk:** Arises from the back of 1st or 2nd part of subclavian artery. It divides into:
 - ***Superior (highest) intercostals** artery to give upper two posterior intercostals arteries.
 - ***Deep cervical** artery which passes to the back of the neck and then ascends among the posterior cervical muscles.



Subclavian artery.

3. The termination of subclavian artery (third part) extends from the lateral border of scalenus anterior muscle and is called **axillary** artery.



Right lateral view of subclavian artery.

The **common carotid artery**: There are two common carotid arteries. The right one originates from the brachiocephalic trunk while the left one originates from the arch of the aorta directly. At the level of upper border of thyroid cartilage, it divides into **external and internal carotid arteries**.

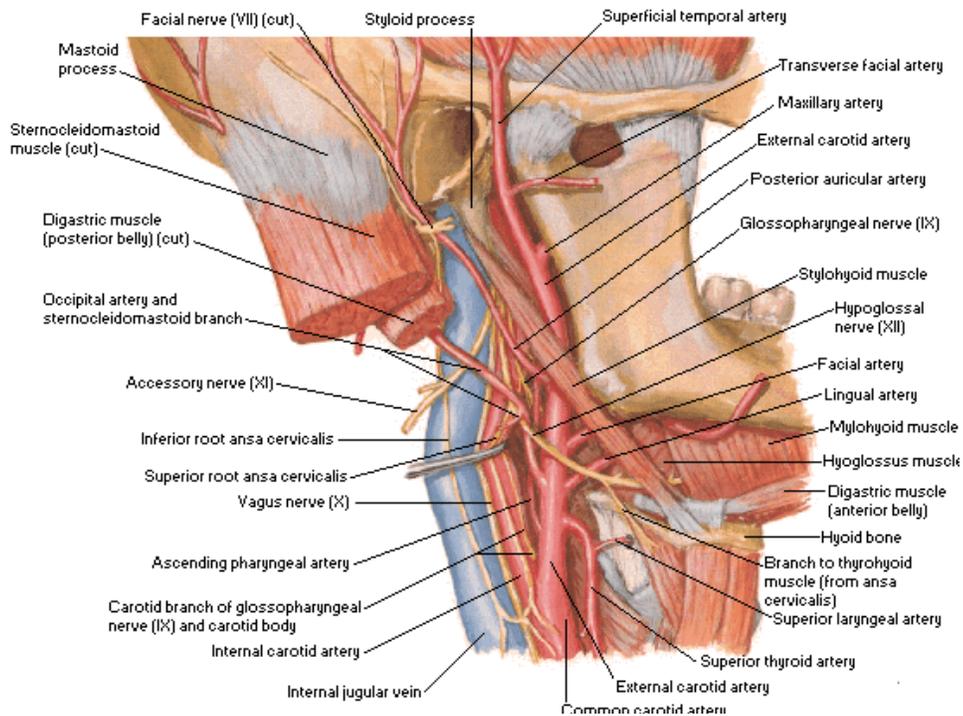
The **External carotid artery** is located anterior and medial to internal carotid artery.

The branches of the **External carotid artery** are:

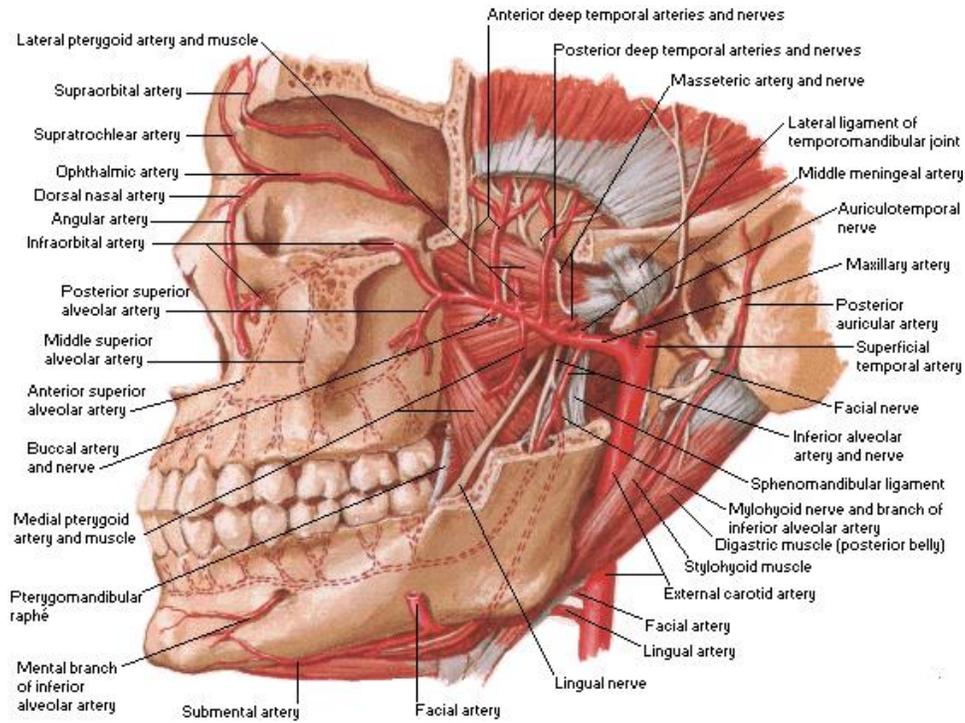
1. **Ascending pharyngeal artery**: It gives branch to the pharynx with the tonsil, branch to the middle ear and three meningeal branches that pass through foramen lacerum, jugular foramen and hypoglossal canal.
2. **Superior thyroid artery**: It gives small **muscular**, small **infrahyoid** artery, **superior laryngeal** artery to supply the upper parts of the larynx and adjacent pharynx. Small **sternocleidomastoid** branch, and **cricothyroid** branch.
3. **Lingual artery** which gives **suprahyoid**, **dorsal lingual** (two or more) deep to hyoglossus muscle to supply the muscle of the tongue, its mucous membrane and palatine tonsil. **Sublingual** branch to sublingual gland and neighboring muscles, and **profunda artery (deep artery)** that enters the tongue till the tip.
4. **Facial artery**: There is a rich anastomosis with additional vessels that supply the face like **transverse facial** (branch of superficial temporal artery), **infraorbital and mental** (branches of maxillary artery) and **dorsal nasal** (branch of ophthalmic artery). The facial artery gives: **Tonsilar** artery to the tonsil, many branches to the **submandibular gland**, **muscles of facial expression**, **tissues of the face**, **soft palate (ascending palatine branches)**, **submental**, and **superior and inferior labial arteries**.
5. **Occipital artery**: It supplies the back of the scalp, sternocleidomastoid muscle, **meningial branch** that passes through jugular foramen, and **mastoid branch** to the dura mater and bone. It descends to anastomose with deep cervical artery.
6. **Posterior auricular artery**: It gives a branch to middle ear through stylomastoid foramen.
7. **Maxillary artery** is divided for descriptive purpose into three parts:
 1. It gives **inferior alveolar** and **middle meningeal** with larger anterior and smaller posterior branches.
 2. To supply muscles of mastication and buccinator.

3. To supply the nasal septum, lateral wall of the nose and the front of the palate. It gives **dental artery** with two or three branches, **infraorbital, greater** (to the posterior part of hard palate) and **lesser palatine** (to the soft palate) and branches to the upper part of the pharynx and pharyngotympanic tube.

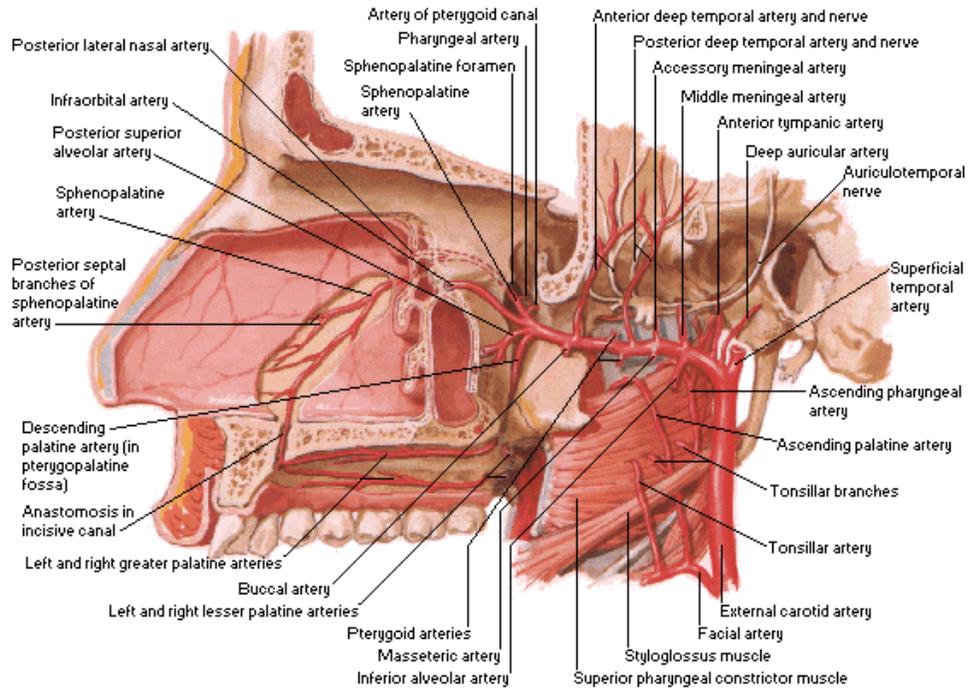
8. **Superficial temporal artery** is a main artery to the anterior portion of the scalp which emerging from substance of parotid gland and divides into **anterior, posterior, middle, and transverse facial** branches.



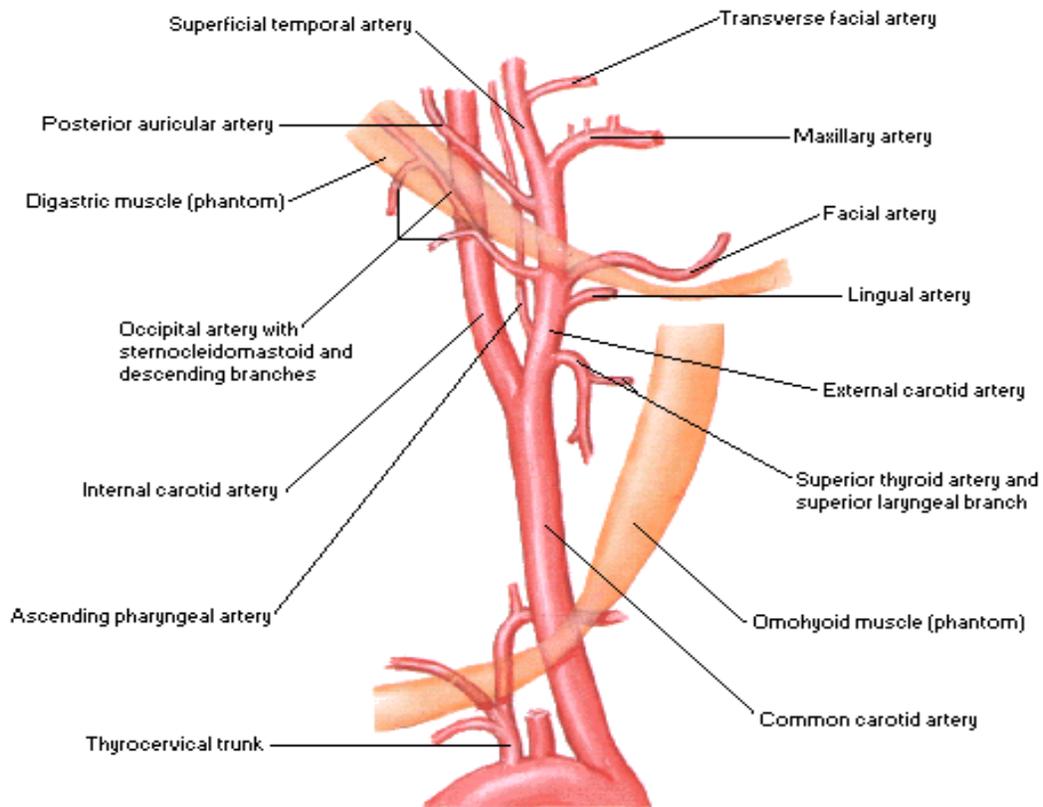
Right lateral dissection of carotid arteries – parotid fossa.



Orbitomaxillary distribution of maxillary artery.



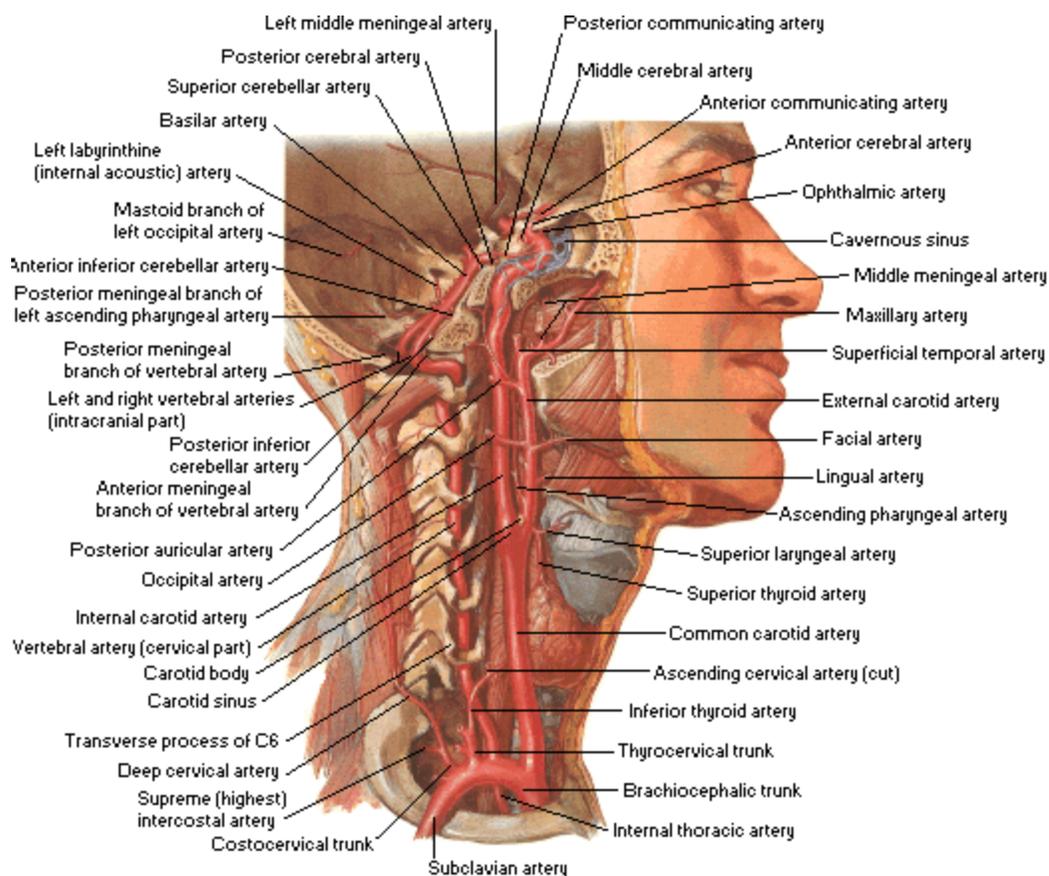
Nasopalatine distribution of maxillary artery.



External carotid artery and branches.

Internal carotid artery is divided for descriptive purpose into:

1. **Cervical portion** within carotid sheath together with internal jugular vein and X nerve. **It gives no branch.**
2. **Petrous portion** to pass through carotid canal.
3. **Cavernous portion:** It gives small branches to the pituitary gland and ophthalmic artery that passes through optic canal with II nerve which gives many branches like retinal, suprtrochlear and supraorbital.
4. **Cerebral portion** that gives anterior and middle cerebral arteries and posterior communicating arteries.



Arteries of the brain and meninges.