

REFERENCE

4. Nerves :

- I) Vagus nerve with its external & internal laryngeal branches.
- II) Hypoglossal nerve.
- III) Ansa cervicalis.
- IV) Spinal root of Accessory nerve.
- V) Sympathetic trunk.

5. Deep cervical lymph nodes:

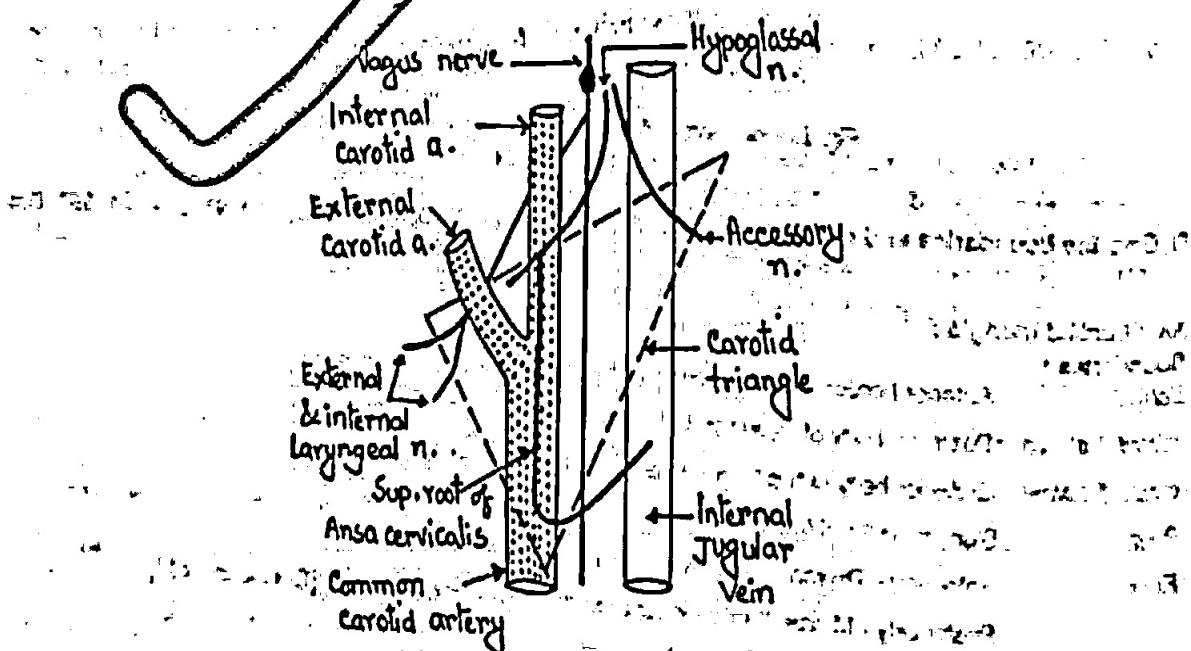
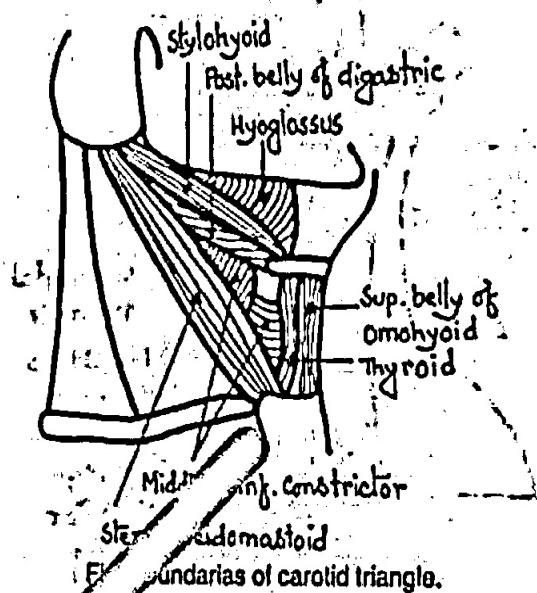


Fig. Contents of carotid triangle.

Q. Write short notes on - "Carotid Sheath". [RU-Ja15, Ju12, Ja09, Ju06, Ja06, M04, J03, S03, DU-S93, 91, 90]
Or, Give the applied anatomy of carotid sheath. (RU- S98, 97, M/S98)

Ans:

Carotid sheath : It is the tubular condensation of deep cervical fascia

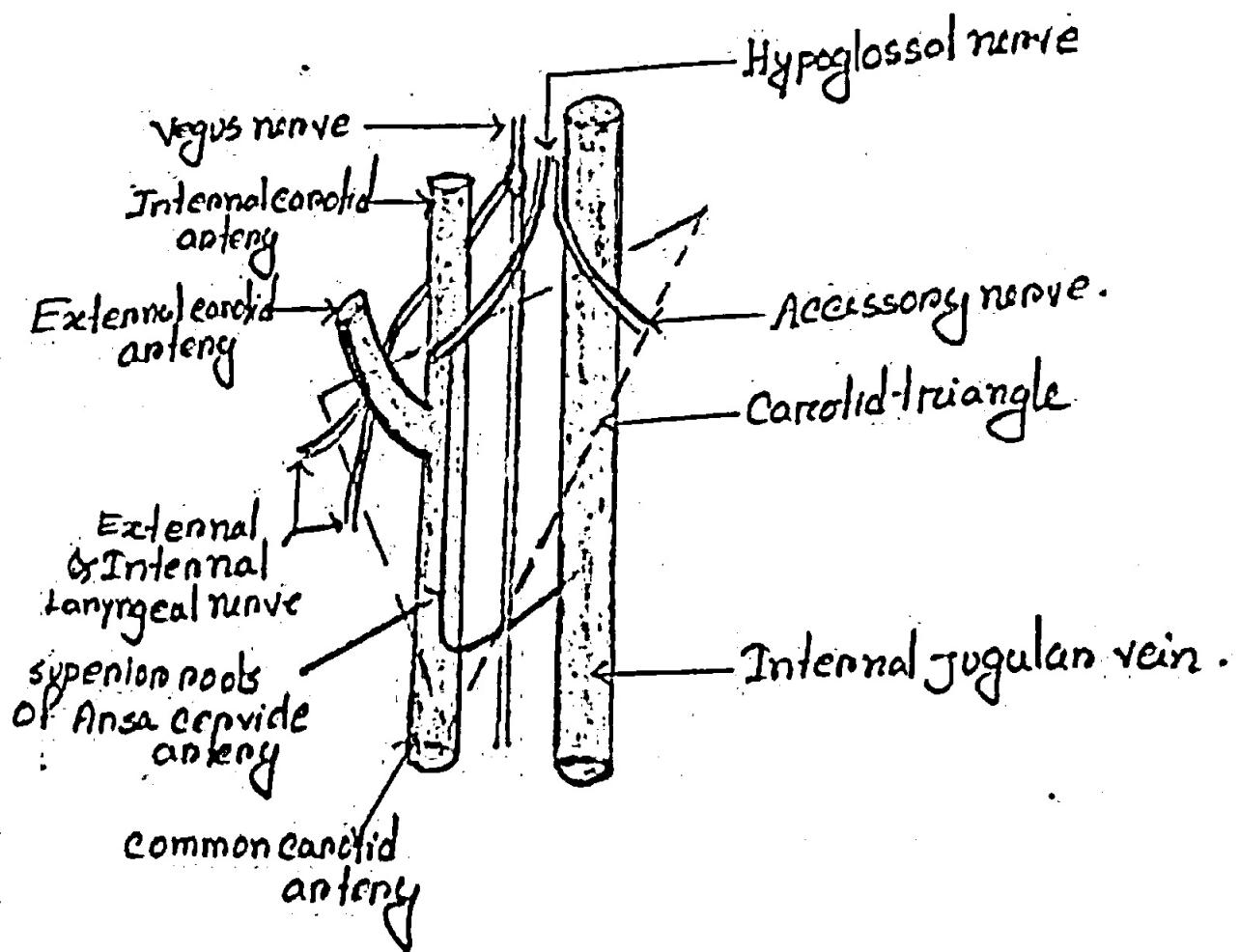


Fig: Contents of the carotid triangle.

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Branches:

1. Superior thyroid
2. Lingual
3. Facial
4. Ascending pharyngeal
5. Occipital
6. Posterior auricular
7. Superficial temporal—Terminal branch
8. Maxillary—Terminal branch.

Note: Of these eight branches no. 1-5 are contained in the carotid triangle and described below.

Superior Thyroid Artery

It arises from the front of the external carotid artery just below the greater cornu of the hyoid bone. It runs downwards and forwards being covered by the skin, superficial fascia, platysma, deep fascia and the anterior edge of the sternocleidomastoid; then it passes to the thyroid gland under cover of the superior belly of the omohyoid, sternohyoid and sternothyroid muscles.

Medially, it is related to the external laryngeal nerve and the inferior constrictor of pharynx.

Branches—

1. Glandular—Anterior and posterior terminal branches.
2. Infrahyoid.
3. Sternocleidomastoid.
4. Cricothyroid.
5. Superior laryngeal—It passes deep to the thyrohyoid muscle in company with the internal laryngeal nerve and enters the larynx by piercing the thyrohyoid membrane, the nerve lying above the artery.

Dissection note: Superior thyroid artery is the lowest branch of the external carotid. Follow it downwards to the gland. Then carefully trace the superior laryngeal branch and the accompanying nerve to the larynx.

Lingual Artery

It arises from the anteromedial aspect of the external carotid artery, opposite the tip of the greater cornu of the hyoid bone, in between the origin of the superior thyroid and facial arteries. After a short course, it passes deep to the hyoglossus above the hyoid bone and finally ends in the tip of the tongue by anastomosing with its fellow of the opposite side.

By the hyoglossus muscle the lingual artery is divided into 3 parts as follows:

- a. First part—Extends from its origin...

Dissection note: Trace the facial artery till it passes deep to the posterior belly of the digastric and stylohyoid. The remaining part of the artery will be found in the digastric triangle.

Ascending Pharyngeal Artery

It arises from the medial aspect of the commencement of the external carotid artery. It passes vertically upwards between the internal carotid artery and the wall of the pharynx to the base of the skull, being crossed by styloglossus and the stylopharyngeus. It anastomoses with the ascending palatine branch of the facial artery.

Branches—

1. Pharyngeal
2. Inferior tympanic
3. Meningeal.

Dissection note: Carefully raise the external carotid artery, then hold the ascending pharyngeal branch and follow it upwards as far as possible.

Occipital Artery

It has been already described on page 15. Only a small part of the artery is found at the upper angle of the carotid triangle.

Internal Carotid Artery

Course— It begins at the bifurcation of the common carotid artery against the upper border of the thyroid cartilage. It ascends along the side of the pharynx to the base of the skull and enters the cranial cavity through the carotid canal of the petrous part of the temporal bone.

Then it runs forwards through the cavernous sinus along the carotid sulcus on the side of the body of the sphenoid and after piercing the duramater, it bends backwards to end below the anterior perforated substance of the brain (by dividing into anterior and middle cerebral arteries). Thus the artery may be divided into four parts—

1. Cervical
2. Petrous
3. Cavernous
4. Cerebral.

Relation of the Cervical Part

It is contained in the carotid sheath along with the internal jugular vein and vagus nerve. External carotid artery lies anteromedial to it below and anterolateral to it above.

1. Posteriorly—Longus capitis, intervened by the sympathetic ganglion and the superior cervical sympathetic ganglion and the superior laryngeal nerve.

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ii. Medially—Wall of the pharynx, ascending pharyngeal artery, pharyngeal veins and external and internal laryngeal nerve.

iii. Anterolaterally—

a. In the carotid triangle—Sternocleidomastoid, occipital artery, facial and lingual veins, hypoglossal nerve and its descending branch.

b. Above the carotid triangle—Posterior belly of the digastric and stylohyoid muscles and the occipital and posterior auricular arteries. The internal carotid is separated from the external carotid artery by the styloid process, styloglossus and stylopharyngeus, glossopharyngeal nerve, pharyngeal branch of the vagus and part of the parotid gland.

At the base of the skull, the 9th, 10th, 11th and 12th cranial nerves lie between the internal carotid artery and internal jugular vein.

~~Branches~~

~~a. From the cervical part~~—Nil

~~b. From the petrous part:~~

1. Caroticotympanic

2. Pterygoid.

~~c. From the cavernous part:~~

1. Cavernous

2. Hypophyscal

3. Meningeal.

~~d. From the cerebral part:~~

1. Ophthalmic

2. Anterior cerebral

3. Middle cerebral

4. Posterior communicating

5. Anterior choroid.

Structures lying between the external and internal carotid arteries:

1. Glossopharyngeal nerve

2. Pharyngeal branch of the vagus

3. Stylopharyngeus muscle

4. Small part of the parotid gland

5. Styloid process.

Internal Jugular Vein

Course—It begins as the direct continuation of the sigmoid sinus in the posterior compartment of the jugular foramen and terminates behind the sternal end of the clavicle by uniting with the subclavian vein to form the brachiocephalic (innominate) vein.

It presents two dilatations, one at its commencement, called the superior bulb which is lodged in the jugular fossa of the temporal bone and the other near its termination, called the inferior bulb.

Relation—At its origin, it lies behind the internal carotid artery separated by the last four cranial nerves, then it descends through the neck being enclosed in the carotid sheath along the lateral side of the internal and common carotid arteries, the vagus nerve intervening between and behind the two.

The vein is covered by the sternocleidomastoid, crossed superficially by the posterior belly of the digastric and the superior belly of the omohyoid muscle by the accessory and the descending cervical nerves and by the posterior auricular, occipital and sternocleidomastoid arteries.

Tributaries—

1. Inferior petrosal sinus
2. Facial
3. Lingual
4. Pharyngeal
5. Superior and middle thyroid
6. Occipital (sometimes).

Dissection note: Clean the internal jugular vein and its tributaries, but except the facial vein, other tributaries may be cleared off the field to show the important arteries and nerves in the triangle. Then, hold the vagus nerve which lies behind and between the common carotid artery and the internal jugular vein.

Find out the internal laryngeal nerve as it emerges from under cover of the external carotid artery near the tip of the greater cornu of hyoid and trace it to the larynx along with the superior laryngeal artery passing deep to the thyrohyoid. A delicate branch of the hypoglossal nerve may now be secured to the thyrohyoid muscle.

External laryngeal nerve will be found on a deeper plane almost in a line with the superior thyroid artery and runs downwards to the muscular triangle. Then follow the internal or external laryngeal nerve upwards to reach the superior laryngeal nerve which lies deep to the internal carotid artery.

Clean the hyoglossus above the hyoid bone and see that the hypoglossal nerve is passing on its surface (but deep to the digastric) to the digastric triangle and the lingual artery disappearing under its posterior border.

A small part of the accessory nerve will be found at the uppermost corner of the carotid triangle running downwards and backwards across the internal jugular vein to enter into the sternocleidomastoid.

Lastly, behind the carotid sheath find out the Sympathetic trunk which can be easily identified by the fusiform shaped superior cervical ganglion lying against the 3rd and 4th cervical vertebra.

Fig. 2.

Vagus Nerve (10th Cranial)

It is a mixed nerve consisting of motor and sensory fibers. The name vagus, has possibly been derived from "Vagabond", because of its extensive course and distribution to the structures in the skull, neck, thorax and abdomen (Fig. 2.19).

1. Motor fibers arise from—

- a. **Dorsal nucleus of the vagus**—It is situated in the floor of the fourth ventricle under the vagal triangle. It is a mixed nucleus. Fibers arising from it, supply the involuntary muscles of the bronchi, heart, esophagus, stomach, small and large intestines up to the right half of the transverse colon. Its secretomotor fibers supply the glands in the alimentary canal, liver, pancreas and kidney.
- b. **Nucleus ambiguus**—It is situated in the medulla oblongata. Fibers arising from it, supply the cricothyroid and the muscles of the

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POSTERIOR TRIANGLE

The posterior triangle lies behind the sternocleidomastoid by the side of the neck (Fig. 2.24).

■ BOUNDARIES

- a. In front—By the posterior margin of the sternocleidomastoid.
- b. Behind—By the anterior margin of the trapezius.
- c. Base—By the upper border of the middle one-third of the clavicle.
- d. Apex—By the meeting point of the sternocleidomastoid and trapezius on the occipital bone.

Note: Before commencing the dissection, the head should be turned to the opposite side and fixed by the hook chain. When the dissection of one side is finished, do the other side with a similar position.

(It is better for the part to finish with the dissection of the posterior triangle prior to that of the anterior triangle).

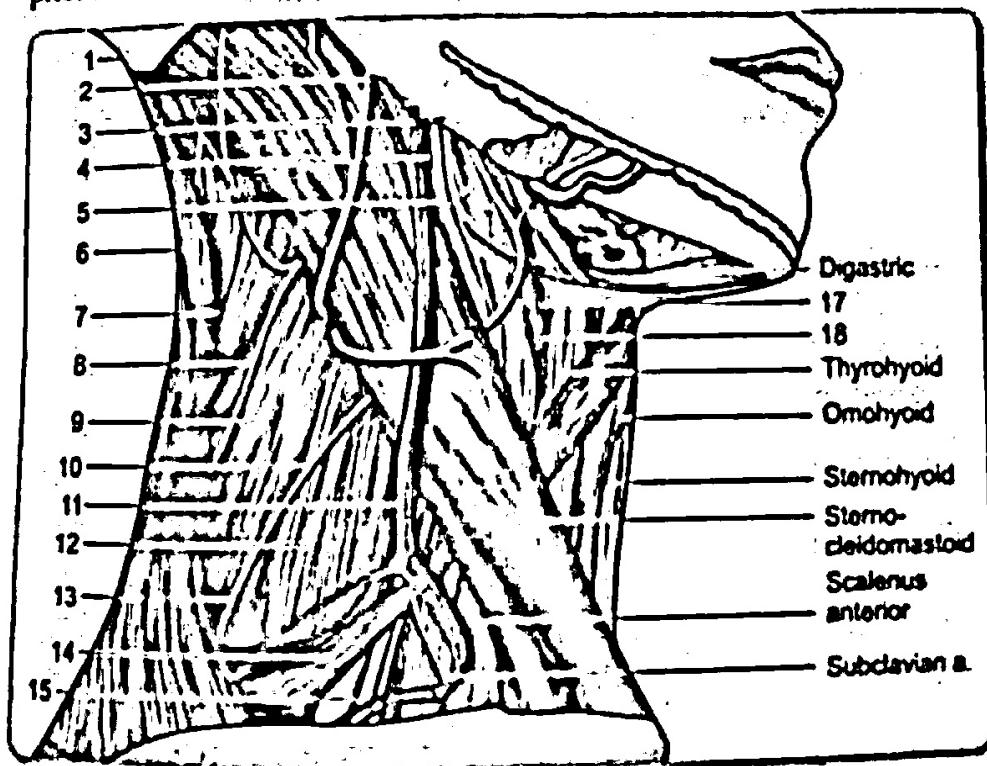


Fig. 2.24: Posterior triangles of the neck: (1) Semispinalis capitis, (2) Posterior auricular, (3) Posterior branch of retromandibular vein, (4) Internal jugular vein, (5) Hypoglossal nerve, (6) Trapezius, (7) Splenius capitis, (8) Accessory nerve, (9) Levator scapular, (10) Dorsal scapular nerve, (11) External jugular vein, (12) Scalenus medius, (13) Transverse cervical artery, (14) Omohyoid inferior belly, (15) Brachial plexus, (17) Nerve to thyroid, (18) Superior root of ansa cervicalis

Deep Fascia

It is described here in two parts—

a. *Deep fascia of the roof*—It is that part of the investing lamina of the deep cervical fascia which stretches between the sternocleidomastoid and the trapezius and forms roof of the posterior triangle. It is pierced by—

1. External jugular vein
2. Three divisions of the Supraclavicular nerves
3. Cutaneous blood vessels
4. Lymph vessels.

b. *Deep fascia of the floor*—It covers the muscle at the floor of the posterior triangle and is continuous medially with the prevertebral lamina of the deep cervical fascia.

Dissection note: Reflect the deep fascia of the roof as that of the skin without injury to the cutaneous structures. The accessory nerve which runs in contact with the under surface of the investing lamina of the deep fascia should be carefully preserved while reflecting it. Clean the lower part of the external jugular vein into which the transverse cervical and the suprascapular veins terminate.

Trace the divisions of the supraclavicular nerves from below upwards to their common trunk at the posterior border of sternocleidomastoid, where other cutaneous nerves should also be cleaned.

Then, remove the remains of fat and deep fascia of the floor taking care that the contents of the triangle are not injured. At the lower part of the triangle, look for the inferior belly of the omohyoid which passes obliquely upwards and medially to the under surface of the sternocleidomastoid and secure its nerve coming from the ansa cervicalis.

Note: The posterior triangle is subdivided by the inferior belly of the omohyoid into an upper larger occipital triangle and a lower smaller supraclavicular triangle.

OCCIPITAL TRIANGLE

Boundaries.

- a. In front—Posterior margin of the sternocleidomastoid.
- b. Behind—Anterior margin of the trapezius.
- c. Base—Inferior belly of the omohyoid.
- d. Apex—Meeting point of the sternocleidomastoid and the trapezius.
- e. Floor—(from above downwards) splenius capitis, levator scapulae, scalenus medius and posterior, covered by the prevertebral layer of the deep cervical fascia.
- f. Roof—Skin, superficial fascia, platysma (at the lower part) and deep fascia.

Contents

1. Occipital artery—Found at the apex of the triangle, while it comes out from beneath the sternocleidomastoid.
2. Superficial cutaneous branches of the cervical plexus—It appear at about the middle of the posterior border of the sternocleidomastoid (mentioned before).
3. Muscular branches to the trapezius and levator scapulae (from the 3rd and 4th cervical nerves)—It appear near the middle of the sternocleidomastoid and enter the respective muscles.
4. Accessory nerve (spinal root)—After piercing the sternocleidomastoid it appears at the junction of the upper third and the lower two-thirds of its posterior border, passes obliquely downwards across the triangle on the levator scapulae and enters into the trapezius on its deep surface, (described).

Note: Remember that this nerve though counted as one of the contents of the triangle but practically it passes in its roof.

5. Upper trunk of the brachial plexus with its following supraclavicular branches
 - a. *Nerve to the rhomboideus major and minor*—It is very delicate nerve passing downwards and backwards, disappears behind the levator scapulae.
 - b. *Nerve to the subclavius*—It is also a delicate nerve. It runs downwards behind the omohyoid on the lateral side of the external jugular vein.
 - c. *Suprascapular nerve*—It runs downwards and backwards lying partly under cover of the inferior belly of the omohyoid. It supplies the supra and infraspinatus muscles and the shoulder joint.
6. Transverse cervical artery—It is a branch of the thyrocervical trunk, it passes laterally crossing in front of the phrenic nerve, scalenus anterior and upper part of brachial plexus but covered by the internal jugular vein sternocleidomastoid and platysma. Then reaching the deep surface of the trapezius, it divides into superficial and deep branches.

Note: This artery will be found at the lower part of the occipital triangle with its accompanying vein.

7. Few deep cervical lymph nodes—Found mostly along the posterior margin of the sternocleidomastoid.

SUPRACLAVICULAR TRIANGLE

Boundaries

- a. *Above*—Inferior belly of the omohyoid.
- b. *Below*—Upper border of the middle-third of the clavicle.
- c. *Base*—Posterior border of the sternocleidomastoid.

- d. Apex—Meeting point of the omohyoid and the clavicle.
- e. Floor—Scalenus medius, the first digitation of the serratus anterior and the 1st rib.
- f. Roof—Skin, superficial fascia, platysma and the deep fascia.

Note: The supraclavicular triangle is usually very small but it should be made wider by cutting the clavicular head of origin of the sternocleidomastoid and reflecting it medially when all the contents of the triangle will be clearly exposed.

Contents

1. Terminal part of the external jugular vein.
2. Middle and lower trunks of the brachial plexus.
3. Nerve to the serratus anterior—Found at the back of the plexus. It arises from the roots of the 5th, 6th and 7th cervical nerves.
4. Lower part of the nerve to the subclavius—(Its upper part is already found in the occipital triangle).
5. Transverse cervical vessels—Only a small part is seen here, they pass to the occipital triangle deep to the omohyoid.
6. Suprascapular vessels—It placed transversely along the upper part of the posterior surface of the clavicle.

Suprascapular artery

It is a branch of the thyrocervical trunk. It runs laterally and accompanying the suprascapular nerve under cover of the trapezius, enters the supraspinous fossa by passing above the suprascapular ligament (suprascapular nerve passing below the ligament), then through the spinoglenoid notch it reaches the infraspinous fossa, where it anastomoses with the circumflex scapular artery and the deep branch of the transverse cervical artery.

7. Third part of the subclavian artery—It extends from the lateral margin of the scalenus anterior (opposite the posterior border of the sternocleidomastoid) to the outer border of the 1st rib (behind the lower border of the middle of the clavicle) from where it is continued as the axillary artery. No branch is given off from this part.

Relation:

- i. In front—Skin, superficial fascia, platysma, supraclavicular nerves, deep fascia and clavicle suprascapular vessels, subclavian vein, subclavius muscle with its nerve of supply and the terminal part of the external jugular vein.
- ii. Behind—Scalenus medius, separated by the lower trunk of the brachial plexus.
- iii. Above—Upper and middle trunks of the brachial plexus and the inferior belly of the omohyoid.
- iv. Below—Upper surface of the 1st rib and the pleura.

Note: In the cadaver the artery has a tendency to sink down, so it has to be pulled up from behind the clavicle at the time of dissection.

8. Phrenic nerve—Usually it is not a content of this triangle, as it is concealed by the sternocleidomastoid, but this nerve should be exposed here by retracting the lower part of the sternocleidomastoid muscle. It will be found descending obliquely in front of the scalenus anterior, cover of its fascia from its lateral to the medial side.

It is a mixed nerve, consisting of motor and sensory fibers in the proportion of 2 : 1. It arises chiefly from the 4th cervical nerve, receives branches from the 3rd and 5th cervical nerves.

9. Few lymph nodes.

Splenius Capitis

- *Origin*—
 1. From the lower half of the ligamentum nuchae.
 2. From the spines of the 7th cervical and the upper four thoracic vertebrae.
- *Insertion*—Into the mastoid process of the temporal bone and to just below the lateral third of the superior nuchal line.
- *Nerve supply*—By the lateral branches of the dorsal (posterior) rami of the 4th, 5th and 6th cervical spinal nerves.
- *Action*—Acting from both sides, the head is drawn backward singly, it bends the head and neck to the same side with turning to that side.

Levator Scapulae

- *Origin*—
 1. From the transverse processes of the atlas and the axis.
 2. From the posterior tubercles of the transverse processes of the 4th cervical vertebra.
- *Insertion*—Into the medial border of the scapula above the inferior angle.

Scalenus

- **Origin**—From the posterior tubercles of the transverse processes of all cervical vertebra.
- **Insertion**—Into the upper surface of the 1st rib between the groove for the subclavian artery and the tubercle of the rib.
- **Nerve supply**—By the branches from the ventral (anterior primary) rami of the 3rd-8th cervical spinal nerves.
- **Action**—Same as above.

Scalenus Posterior

- **Origin**—From the posterior tubercles of the transverse processes of the 4th, 5th and 6th cervical vertebra.
- **Insertion**—Into the supero-lateral surface of the 2nd behind the impression for the serratus anterior.
- **Nerve supply**—By the branches from the ventral (anterior primary) rami of the lower three cervical spinal nerves.
- **Action**—
 1. It bends the neck to the same side.
 2. It elevates the 2nd rib.

SUBOCCIPITAL TRIANGLE

It is a small deep seated, triangular space situated just below the squamous part of the occipital bone at the upper most part of the back of the neck.

Note. Before starting the dissection, the head should be clean-shaved and flexed properly by placing a block under the chest as to make the part stretched.

Skin Incision

1. A longitudinal incision along the middle line from the external occipital protuberance to a point midway between the spine of the vertebra prominens and the external occipital protuberance.
2. Two transverse incisions, one from each end of the first incision extending laterally for about three inches.

Skin

Thick and fibrous. Reflect it laterally.

Superficial fascia—It is tough and contains moderate amount of fat. It has to be carefully reflected without injury to the following *cutaneous structures in it*—

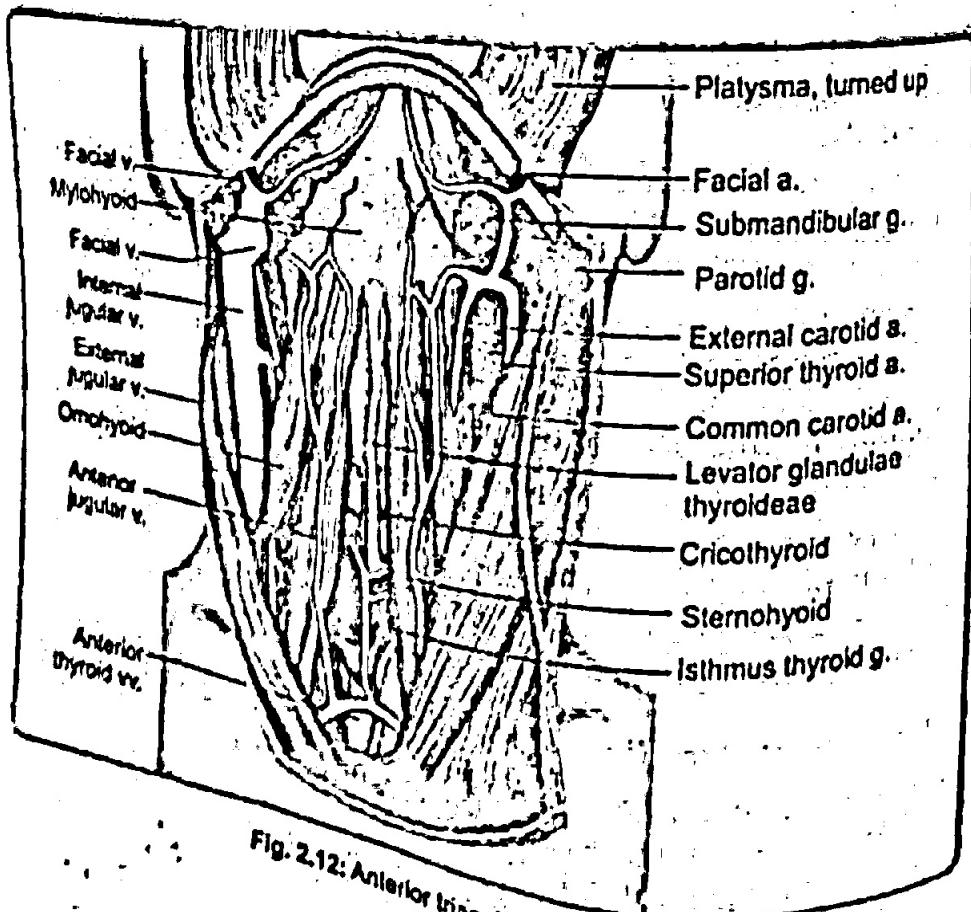
ANTERIOR TRIANGLE

It is a triangular area on each side of the front of the neck.

BOUNDARY

- (a) In front—By the middle line of the neck extending from the chin to the jugular notch.
- (b) Behind—By the anterior border of the sternocleidomastoid.
- (c) Base—By the base of the mandible and a line from its angle to the mastoid process.
- (d) Apex—By the upper end of the manubrium sterni (remember that the anterior and posterior triangles of the neck are named according to the anterior and posterior positions of these triangles in relation to the Sternocleidomastoid and not in relation to the neck as a whole).

Note: Before the dissection is started, the head should be allowed to hang backwards as to make the part stretched by putting wooden blocks behind the body and fix it in the required position with the hook chain (Fig. 2.12).



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Note

1. Greater occipital nerve—It is the larger medial branch of the dorsal (posterior primary) ramus of the 2nd cervical nerve.

It appears below the obliquus capitis inferior and winding round its lower border runs upwards and medially across the suboccipital triangle under cover of the semispinalis capitis; then it pierces this muscle and running upwards for a short distance pierces the trapezius and deep fascia down to the superior nuchal line about an inch lateral to the external occipital protuberance.

It supplies the skin of the back of the head as far as the vertex and also gives a muscular branch to the semispinalis capitis.

- 2. Third occipital nerve (described).**
- 3. Terminal branches of the occipital artery**—Supply the scalp as high as the vertex in company with the branches of the greater occipital nerve.

Deep Fascia

It is here that part of the investing lamina of fascia colli, which is attached above to the external occipital protuberance and superior nuchal line and behind to the ligamentum nuchae.

Dissection note: Reflect the deep fascia as that of skin preserving the cutaneous structures. Then, the following muscles will be required to separate as to expose the suboccipital triangle which is placed deep to these muscles—

- a. **Trapezius**—Cut at its origin from the superior nuchal line and from the ligamentum nuchae, then reflect it downwards.
Note that this muscle is very thin in this region, so particular care should be taken not to reflect it along with the deep fascia.
- b. **Splenius capitis**—Cut at its insertion from the occipital bone and reflect it downwards. Note that the fibers of this muscle are directed obliquely, whereas those of the semispinalis capitis are vertical.
- c. **Semispinalis capitis**—Cut at its insertion from the occipital bone and reflect it downwards. While reflecting, preserve the nerve twig that enters this muscle for supply.
- d. **Longissimus capitis**—It is placed vertically just outside the semispinalis capitis. It should be retracted laterally by the hook chain.

What is the guide to reach "the triangle" from the exterior?

The greater occipital nerve serves as a guide to reach the triangle, as this nerve can be traced by dissecting step by step from the superficial fascia to the lower border of the obliquus capitis inferior, just above which the triangle is situated. So, care should be taken to preserve this nerve while reflecting the muscles for the exposure of the triangle.

Boundaries of the Triangle

- a. **Above and medially**—Rectus capitis posterior major.
- b. **Above and laterally**—Obliquus capitis superior.

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- d. Occipi

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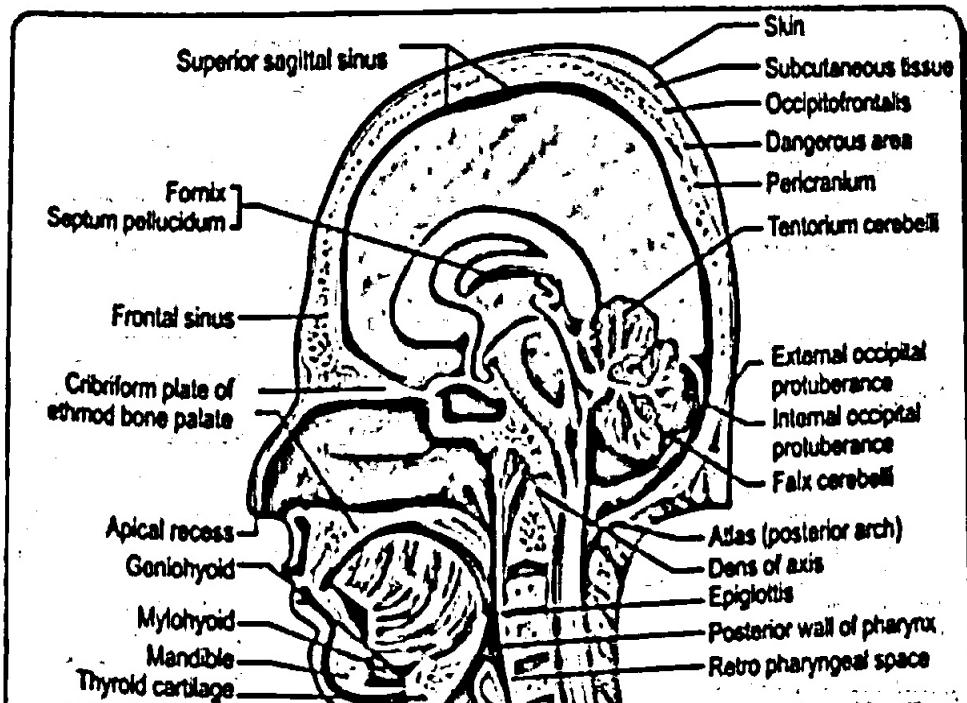
- c. Below and laterally—Obliquus capitis inferior.
- d. Roof—Formed medially by the semispinalis capitis with a layer of dense fibro-fatty tissue on its deep surface and laterally by the longissimus capitis.
- e. Floor—Formed by the posterior arch of the atlas and the posterior atlanto-occipital membrane.

Dissection note: Remove the fibro-fatty tissue from the space and clean the muscles of the boundaries very carefully, so that the nerve twigs supplying them be not injured. The greater occipital nerve will now be found to pass upwards across the medial part of the triangle.

Hold one of the muscular branches and follow it to the posterior arch of the atlas where the trunk of the nerve will be found to come below the vertebral artery. Then, from the trunk trace the other branches. The nerve to the rectus minor will be found to enter the muscle passing across the rectus major (Fig. 2.25).

Contents of the Triangle

- ✓ 1. Dorsal (posterior primary) ramus of the 1st cervical nerve or sub-occipital nerve.
- ✓ 2. Third part of the vertebral artery.
- ✓ 3. Suboccipital plexus of veins.
- ✓ 4. Tough fibrous tissue and fat.



- *Insertion*—Into the upper surface of the 1st rib between the groove for the subclavian artery and the tubercle of the rib.
- *Nerve supply*—By the branches from the ventral (anterior primary) rami of the 3rd-8th cervical spinal nerves.
- *Action*—Same as above.

Scalenus Posterior

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Superficial fascia—It is tough and contains moderate amount of fat. It has to be carefully reflected without injury to the following cutaneous structures in it—

1. Greater occipital nerve—It is the larger medial branch of the dorsal (posterior primary) ramus of the 2nd cervical nerve.

It appears below the obliquus capitis inferior and winding round its lower border runs upwards and medially across the suboccipital triangle under cover of the semispinalis capitis; then it pierces this muscle and running upwards for a short distance pierces the trapezius and deep fascia close to the superior nuchal line about an inch lateral to the external occipital protuberance.

It supplies the skin of the back of the head as far as the vertex and also gives a muscular branch to the semispinalis capitis.

2. Third occipital nerve (described).
 3. Terminal branches of the occipital artery—Supply the scalp as high as the vertex in company with the branches of the greater occipital nerve.

Deep Fascia

It is here that part of the investing lamina of fascia colli, which is attached above to the external occipital protuberance and superior nuchal line and behind to the ligamentum nuchae.

Dissection note: Reflect the deep fascia as that of skin preserving the cutaneous structures. Then, the following muscles will be required to separate as to expose the suboccipital triangle which is placed deep to these muscles—

- a. *Trapezius*—Cut at its origin from the superior nuchal line and from the ligamentum nuchae, then reflect it downwards.
 Note that this muscle is very thin in this region, so particular care should be taken not to reflect it along with the deep fascia.
- b. *Splenius capitis*—Cut at its insertion from the occipital bone and reflect it downwards. Note that the fibers of this muscle are directed obliquely, whereas those of the semispinalis capitis are vertical.
- c. *Semispinalis capitis*—Cut at its insertion from the occipital bone and reflect it downwards. While reflecting, preserve the nerve twig that enters this muscle for supply.
- d. *Longissimus capitis*—It is placed vertically just outside the semispinalis capitis. It should be retracted laterally by the hook chain.

What is the guide?

Q. Give the steps of dissection of - 'Sub-occipital triangle of the neck'. [RU-M18, 15, Ja14, S04, M03, J98]

Ans: Sub-occipital triangle: [RU-M18, 15, Ja14, S04, M03, J98]
Steps of dissection:

A. Skin incision:

- i) A longitudinal incision along the midline from the external occipital protuberance to the midpoint & from it to spine of C₇ vertebra.
- ii) Two transverse incision, one from each end of 1st incision extending laterally for about 7.5 cm.
Then the skin is reflected laterally.

B. Then the superficial fascia is reflected by preserving the cutaneous structures.

C. Then the deep fascia is exposed as that of the skin.

D. Then the fibrofatty tissue from the space is cleaned & the contents is studies. (Mannan's 10th)

Q. Give the boundaries & contents of the sub-occipital triangle. [RU-M16, 15, Ja14, 10, J99, J98, M95]

Q. Short note- sub-occipital triangle. (RU-Ju08)

Ans: Sub-occipital triangle:

- a) Above & medially: Rectus capitis posterior major.
- b) Above & laterally: Obliquus capitis superior.
- c) Below & laterally: Obliquus capitis inferior.
- d) Roof: Semispinalis capitis & longissimus capitis.
- e) Floor: Posterior arch of atlas & posterior atlanto occipital membrane.

Obliquus
Capitis Superior



■ SKIN INCISIONS

steps the dissection of Ant triangle

(fibers of dig. 3d (Ex) 2)

1. A longitudinal incision from the jugular notch to the symphysis menti along the middle line of the neck.
2. An oblique incision from the symphysis menti to the angle of the mandible along its base, then carrying it to the tip of the mastoid process.
Reflect the triangular flap of the skin downwards and laterally up to the anterior margin of the sternocleidomastoid.

Superficial Fascia

It is loosely connected with the skin and contains a variable amount of fat which is seen greatly accumulated below the chin in fatty persons.

Dissection note: After removal of the skin, the fibers of the platysma will be seen intimately blended with the superficial fascia at the upper part of the triangle. So, the superficial fascia has to be reflected along with the platysma as a single layer, but carefully preserve the following cutaneous structures—

1. **Transverse (anterior) cutaneous nerve of the neck**—It arises from the 2nd and 3rd cervical nerves. It turns round the middle of the posterior border of the sternocleidomastoid where it pierces the deep fascia and runs forwards across the muscle; then it divides into ascending and descending branches, which after piercing the platysma, supply the skin of the anterior triangle.

Note: Trace this nerve and turn it backwards by detaching its terminal end.

2. **Cervical branch of the facial nerve**—It emerges from the lower part of the parotid gland and after piercing the deep fascia, it passes forwards below the mandible and enters into the platysma through its deep surface to supply the muscle. It communicates with the transverse (anterior) cutaneous nerve of the neck.

Note: This nerve is generally taken away with the platysma in course of dissection.

3. **Anterior Jugular vein**—It begins near the hyoid bone by the union of several small superficial veins from the submandibular region and descends through the superficial fascia lying about $\frac{1}{2}$ " from the median plane. A little above the sternum it pierces the deep fascia and bending laterally under cover of the sternocleidomastoid, it ends into the external Jugular vein.

At the point of its bending the vein is connected with its fellow of the opposite side by a short transverse venous arch called the **Jugular arch**.

Peculiarities of the anterior jugular vein: Size of this vein is inversely proportional to that of the external Jugular vein. Sometimes, it may be absent, or the veins of the two sides may be united to form a single median vein. It has no valves.

Note: Cut this vein and the jugular arch and push them aside.

- c. **Axilla**—It descends to the posterior wall of the superior mediastinum. It ends by blending with the anterior longitudinal ligament.
 - d. **Laterally**—It extends over the scalenus anterior and medius and levator scapulae, thus forming a fascial floor in the posterior triangle of the neck. It is also continued downwards and laterally over the brachial plexus nerves and subclavian vessels behind the clavicle as the axillary sheath.
 - e. **Posteriorly**—The prevertebral lamina is separated on either side from the buccopharyngeal fascia by an interval, known as the retropharyngeal space which contains loose areolar tissue and few retropharyngeal lymph glands. This space extends as high as the base of the skull and inferiorly it becomes continuous with the superior mediastinum.
- It has to be noted that the following nerves lie behind the prevertebral lamina—
- a. Anterior primary rami of the cervical nerves
 - b. The phrenic nerve
 - c. Nerve to the rhomboids
 - d. Nerve to the serratus anterior.

Surgical Importance of the Fascia Colli

Beneath the investing lamina if there is any formation of pus in the anterior triangle, it may track down into the thorax as the pretracheal lamina is continued downwards into the mediastinum. Pus forming behind the prevertebral lamina in case of chronic retropharyngeal abscess (cold abscess) due to caries of the bodies of the cervical vertebra, the posterior wall of the pharynx will be pushed forwards in the median plane or the pus may extend laterally and point in the posterior triangle.

Sometimes, the retropharyngeal lymph glands of one side may be infected leading to the formation of acute retropharyngeal abscess, which will push the wall of the pharynx on one side but the pus cannot go to the other side, as the prevertebral lamina and the buccopharyngeal fascia are fixed in the middle line.

Carotid Sheath

A tubular condensation of the deep cervical fascia.

Formation

- a. **Anteriorly**—By the pretracheal lamina.
- b. **Posteriorly**—By the prevertebral lamina.
- c. **Laterally**—By the fusion of the pretracheal and prevertebral lamina.
- d. **Medially**—By a mass of loose areolar tissue connecting the pretracheal and the prevertebral lamina.

Situation—It is situated in the interval, bounded behind by the scaleni muscles and the transverse processes of the cervical vertebrae, laterally by the sternocleidomastoid and medially by the larynx, pharynx, upper parts of the trachea and oesophagus and the lobe of the thyroid gland.

Extension—It extends over the neck, but a clinician
Content:
 1. Common carotid artery
 2. Internal jugular vein
 3. Vagus nerve

- Relation**
- a. **Anteriorly**—the descending hypoglossal nerve, the sheath of the vagus nerve.
 - b. **Posterior**.

Dissection note
Identify the prevertebral lamina as the nerves from the cervical plexus. Then identify the muscular slip of the sternocleidomastoid posterior to the muscle by the hook.

Subdivision

- 1. Muscular
- 2. Carotid sheath
- 3. Digastric
- 4. Submeningeal

Posterior triangle

Musculature—It extends roughly from the base of the skull to the root of the neck, but a clear cut limit of the upper and lower ends cannot be ascertained.

Vessels—Common and internal carotid arteries—Medially

Internal jugular vein—Laterally

Fogus nerve—Between and behind the artery and vein.

Relations

- a. Anteriorly—Ansa cervicalis (hypoglossi) and its constituent nerves; specially the descending branch of the hypoglossal nerve (nervus descendens hypoglossi) runs downwards being embedded in the anterior wall of the sheath or sometimes, passes within the sheath.
- b. Posteriorly—The sympathetic trunk.

Dissection note: After a thorough study of the deep cervical fascia, reflect the investing lamina as that of the skin taking care that the cutaneous structures and the underlying nerves from the ansa cervicalis are not injured.

Then define the subdivisions of the anterior triangle; for that purpose, first of all identify the superior belly of the omohyoid, which will be found as a narrow, thin, muscular strip obliquely placed from the hyoid bone to a point on the deep surface of the sternocleidomastoid about 2" above the clavicle. Next, clean the anterior and posterior bellies of the digastric and retract the sternocleidomastoid a little backwards by the hook chain.

Subdivisions of the Anterior Triangle (Fig. 2.15)

- 1. Muscular triangle
- 2. Carotid triangle → * * * Boundary, content
- 3. Digastric triangle
- 4. Submental triangle.

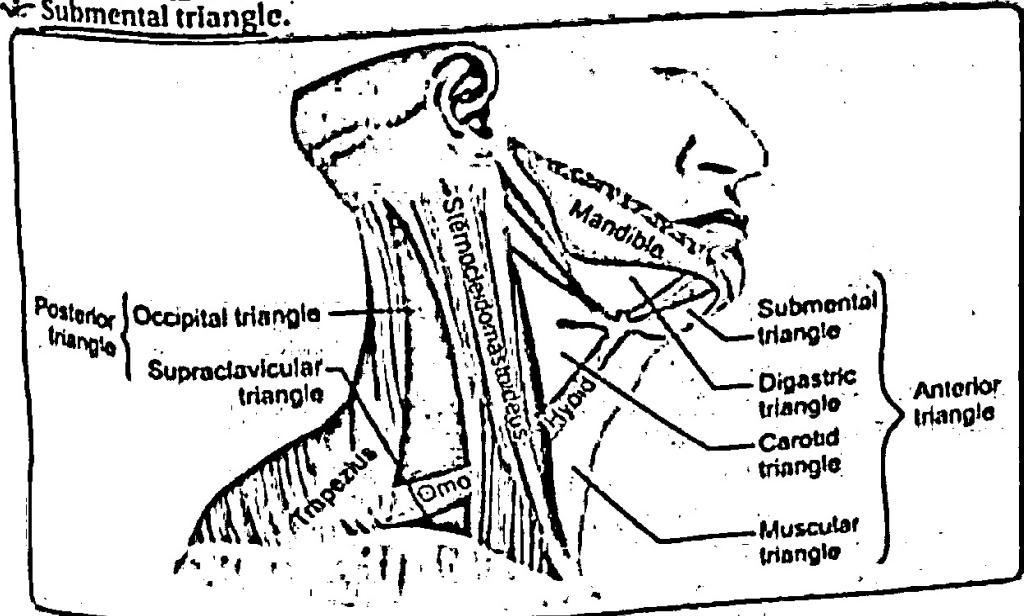


Fig. 2.15: Triangles of the right side of the neck

~~CAROTID TRIANGLE~~

It is so named as portions of all the three carotid arteries (common, external and internal) are contained in this triangle.

~~Boundaries of the Triangle~~

- (a) Behind—(Anterior border of the sternocleidomastoid.)
- (b) In front and above—Posterior belly of the digastric and stylohyoid.
- (c) In front and below—Superior belly of the omohyoid.
- (d) Roof—(Skin) superficial fascia, platysma and the deep fascia.
- (e) Floor—Anteriorly : Thyrohyoid and hyoglossus and posteriorly middle and inferior constrictors of the pharynx.)

~~Contents of the Triangle (Fig. 2.18)~~

- a. Carotid sheath.
- b. Arteries:
 1. Distal part of the common carotid and the proximal parts of the external carotid arteries.
- 2. Superior thyroid, lingual, facial, occipital and ascending pharyngeal branches of the external carotid artery.
- c. Veins: Internal jugular vein and its six tributaries (facial, lingual, occipital, pharyngeal, superior and middle thyroid veins).

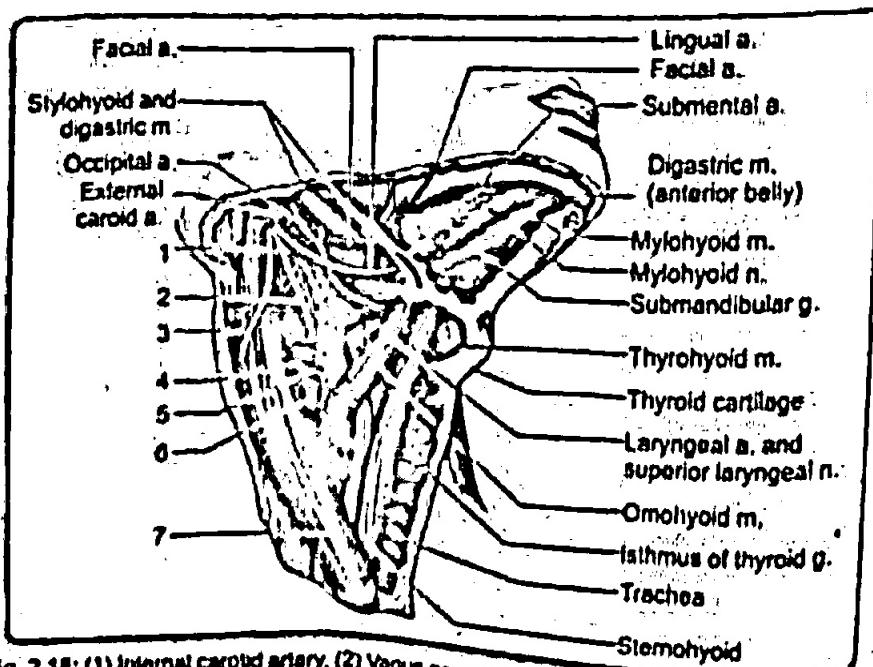


Fig. 2.18: (1) Internal carotid artery, (2) Vagus nerve, (3) Accessory nerve, (4) Common carotid artery, (5) Superior root ansa cervicalis, (6) Inferior thyroid artery, (7) Sternocleidomastoid muscle

- (d) Nervous
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- (d) Nerves: Vagus nerve with its external and internal laryngeal branches; hypoglossal nerve with its descending and thyrohyoid branches; ansa cervicalis with its three branches; nervus descendens cervicalis; Accessory nerve and the sympathetic trunk.
- (e) Other structures: Part of the larynx and trachea, greater cornu of the hyoid bone carotid body, some lymph vessels and glands.

Dissection note: Full the sternocleidomastoid backwards as far as possible by the hook chain, so as to widely expose the triangle for clear identification of the structures. Then clean the space by removing the remains of the fascia colli and the surrounding fat, taking care that the ansa cervicalis and its constituent nerves, which are placed in front of the carotid sheath, be not injured.

At the upper part of the triangle, first secure the lower part of the facial vein terminating into the internal jugular vein. Next, proceed to display the ansa cervicalis and its constituent nerves according to the following procedure:

At first, hold the hypoglossal nerve as it descends by crossing outside the internal and external carotid arteries and follow the nerve forwards till it disappears under the posterior belly of the digastric; then secure the descending branch of the hypoglossal nerve and trace it downwards, either in front or sometimes within the carotid sheath till the ansa is reached at the lower part of the triangle.

Now, from this ansa (loop), the descending cervical nerve has to be traced upwards as far as possible, then secure the three branches of the ansa to the respective muscles.

While tracing the nervus descendens hypoglossi, try to preserve its small branch to the superior belly of the omohyoid.

Ansa Cervicalis (Hypoglossi)

Definition and Formation

It is a loop of nerve formed by the union of the superior root of the ansa cervicalis (nervus descendens hypoglossi) with the inferior root of the ansa cervicalis (nervus descendens cervicalis).

Situation—It is situated in front of the carotid sheath, opposite the common carotid artery at the level of the cricoid cartilage.

Branches—(3 in number) to the sternohyoid, sternothyroid and the inferior belly of the omohyoid (branches may go individually to the muscles or by one or two stems but ultimately dividing into three).

Derivation of the fibers—From the anterior primary rami of the 1st, 2nd and 3rd cervical nerves; the nervus descendens hypoglossi being derived from the 1st cervical and the nervus descendens cervicalis from the 2nd and 3rd cervical spinal nerves).

Dissection note: After studying the ansa and its constituent nerves, push them aside; then remove the carotid sheath and find out the contents as mentioned before. Follow the common carotid artery from below upwards and get into its two terminal branches. First clean the internal carotid artery which gives no branch in the neck and lies lateral to the external carotid artery. Then clean the external carotid artery and its five branches in this triangle.

Common Carotid Artery

Two in number, right and left. The right common carotid artery begins at the bifurcation of the brachiocephalic (innominate) artery behind the right sternoclavicular joint, whereas the left one springs from the arch of the aorta; thus it has got a thoracic and a cervical portion. Each ends by dividing into external and internal carotid arteries at the level of the upper border of the thyroid cartilage.

(1) Thoracic part of the left common carotid artery. Runs upwards from the

1. Thoracic part of the left common carotid artery: Runs upwards from the arch of the aorta to behind the left sternoclavicular joint, where it becomes continuous with the cervical part.

Relation:

- In front—Manubrium sterni, sternohyoid and sternothyroid muscles, left pleura and lung, left brachiocephalic vein and the remains of thymus.
- Behind—Trachea, left subclavian artery, esophagus, left recurrent laryngeal nerve and the thoracic duct.
- To the left—Left vagus and phrenic nerves, the left pleura and lung.
- To the right—Brachiocephalic artery, trachea, inferior thyroid veins and the remains of thymus.

Branch—nil.

2. Cervical part of the right and left common carotid artery: Same on both sides. Each runs from behind the sternoclavicular joint to the upper border of the thyroid cartilage. In the neck, the common carotid artery together with the internal jugular vein and vagus nerve is contained within the carotid sheath.

Relation

- Anterolaterally—(At the upper part) the skin, superficial fascia, platysma, fascia colli, anterior margin of the sternocleidomastoid. (At the lower part) the inferior belly of the omohyoid, sternohyoid and sternothyroid muscles intervene between the artery and the sternocleidomastoid. Nervus descendens hypoglossi and the ansa lie in front of the artery separated by the carotid sheath. Sternocleidomastoid branch of the superior thyroid artery crosses the artery from its medial to the lateral side. Superior and middle thyroid veins cross the artery at the lower part.
- Posteriorly—Transverse processes of the lower four cervical vertebra, prevertebral muscles and lamina, sympathetic trunk, ascending cervical artery and on the left side, the thoracic duct.
- Medially—Pharynx, larynx, trachea, esophagus, inferior thyroid artery, recurrent laryngeal nerve and the thyroid gland.
- Laterally—Internal jugular vein.
- Posterolaterally—Vagus nerve.

Branch— Excepting the terminal branches (external and internal carotid artery), the common carotid artery usually gives no branch in the neck or thorax.



Peculiarities of the Common Carotid Artery

1. Two carotid arteries may arise from a single trunk.
2. Right common carotid artery may arise as a separate branch from the arch of aorta and the left from the brachiocephalic artery.
3. Division of the artery may occur higher or lower than the usual site.
4. Vertebral, superior and inferior thyroid, occipital and ascending pharyngeal arteries may arise from it.

Carotid Sinus

It is a slight dilatation at the point of division of the carotid artery. Here, the tunica media is proportionately thinner than the tunica adventitia of the wall. The sinus is richly supplied with the sympathetic and the parasympathetic (9th and 10th cranial) nerves.

Function—(It regulates blood pressure.) Distension of the sinus with blood stimulates the nerve ending in its wall, thereby reflexly causes slowing of the heart rate and lowering of the blood pressure.

Carotid body—(It is a small oval reddish brown structure behind the point of division of the common carotid artery.)

Function—It acts as a reflex stimulator of the respiratory center, when the amount of carbon dioxide is increased in the blood.

External Carotid Artery

It is named external as it supplies the parts outside the cranium.

Course—It begins at the bifurcation of the common carotid artery opposite the upper border of the thyroid cartilage and ascends with a slight anteroposterior curve to a point midway between the tip of the mastoid process and the angle of mandible, where, in the substance of the parotid gland it ends by dividing into superficial temporal and maxillary arteries.

Lower two-third of the artery is contained in the carotid triangle and then leaves it being externally crossed by the posterior belly of the digastric and stylohyoid; the upper-third lies above the digastric on the postero-medial surface of the parotid gland.

Relation

- a. Anterolaterally—Skin superficial fascia with platysma, fascia colli, anterior margin of the sternocleidomastoid and crossed by the hypoglossal nerve, lingual and facial veins.
- b. Posteromedially—Internal carotid artery, but separated from it by the styloid process, styloglossus and stylopharyngeus muscle, the glossopharyngeal nerve, pharyngeal branch of the vagus and a small part of the parotid gland.
- c. Medially—