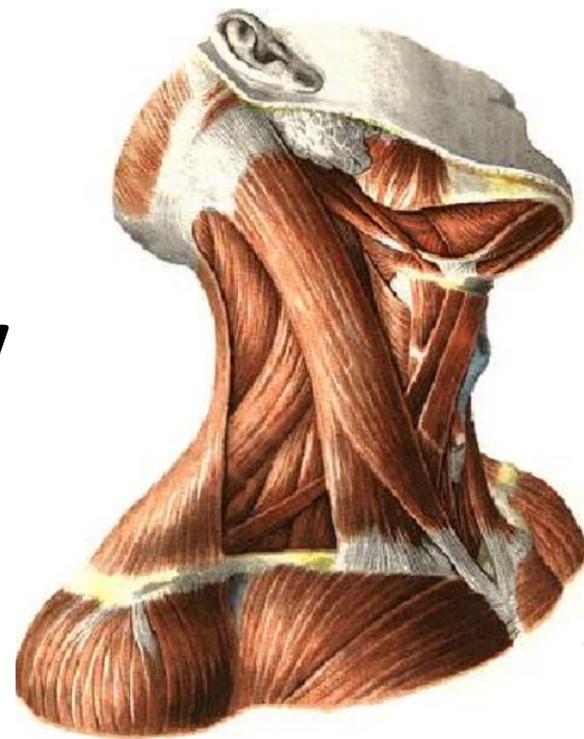


**Federal State Budgetary Educational Institution of Higher Education
«Prof. V.F. Voino-Yasenetsky Krasnoyarsk State Medical University» of
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Surgical Anatomy and Operative Neck surgery



LECTURE PLAN

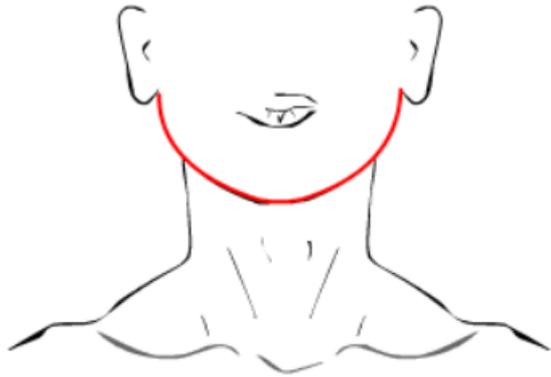
1. Neck borders.
2. Neck area.
3. Fascia of the neck.
4. Cellular spaces of the neck.
5. Surgical anatomy of neck triangles. The borders.
Layered structure.
6. Surgical anatomy of the larynx, pharynx, esophagus, trachea, thyroid gland, parathyroid glands.
7. Operations on organs and neurovascular formations of the neck.

PURPOSE

To give a topographic and anatomical justification of the basic principles of surgical interventions on the neck.

- Many important anatomical formations are concentrated in a small space in the neck area: blood vessels of the brain, the beginning of the respiratory tract, the digestive tract, vagus nerves and borderline sympathetic trunks, the thyroid gland and brachial plexuses, and blood vessels of the upper extremities. All this creates difficulties of a technical nature during operations on neck tissues and requires considerable responsibility of the surgeon.

NECK BORDERS

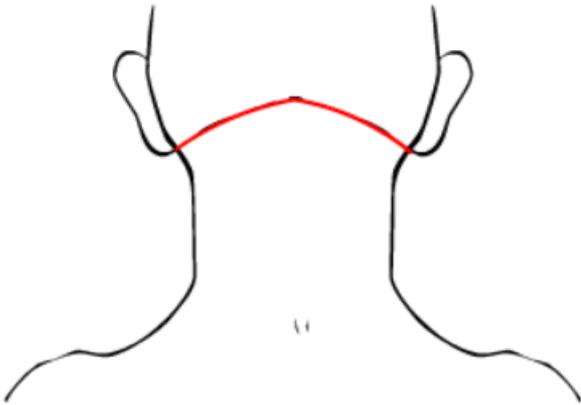


UPPER:

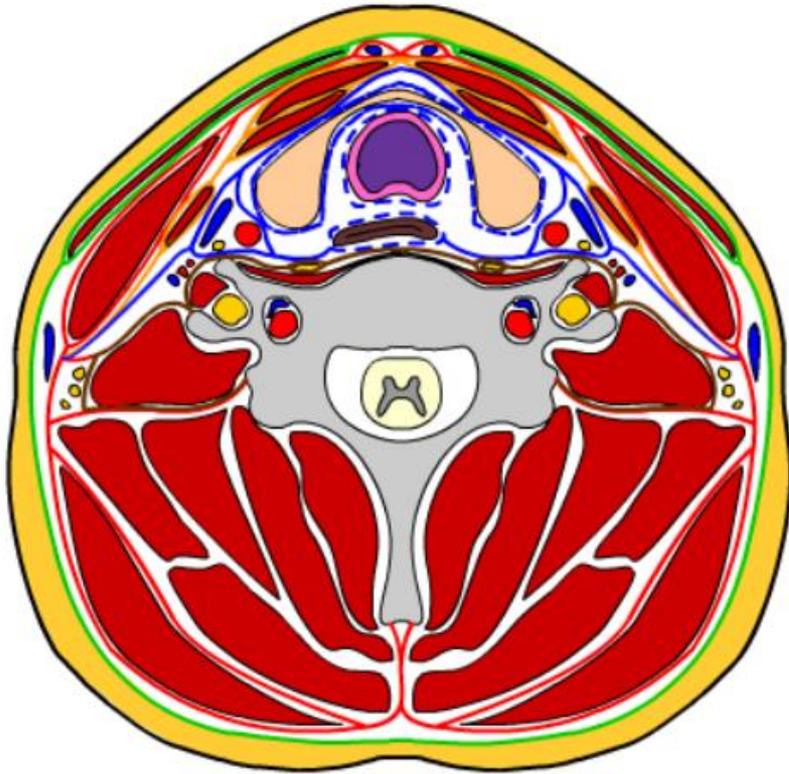
The lower edge of the mandible, the tip of the mastoid process, the upper frontal line, the external occipital protuberance.

LOWER:

The upper edge of the sternum and clavicle, a line drawn from the acromial process of the scapula to the spinous process of the VII cervical vertebra



FASCIA OF THE NECK (V.N. SHEVKUNENKO)



- **THE FIRST FASCIA**

is a thin, weakly expressed connective tissue plate. Forms a vagina for M. platysma.

- **The SECOND FASCIA**

begins with the spinous processes of the vertebrae and surrounds the entire neck. On the sides, there are connective-woven plates going to the transverse processes of the cervical vertebrae. At the top, it is attached to the edge of the collarbones and sternum. Forms a vagina for M. sternocleidomastoids and M. trapezius and a capsule for the submandibular salivary gland.

- **THE THIRD FASCIA**

has the shape of a trapezoid (borders: at the top – the hyoid bone, at the bottom – the inner surface of the sternum and clavicle, bilateral –scapular-hyoid muscles). Along the middle line, the second and third fascia fuse, forming a white neck line. At the bottom, there is an interfacial gap between the second and third fascia, bounded from below by the upper edge of the sternum handle – the chest interaponeuratic cellular space.

- **THE FOURTH FASCIA**

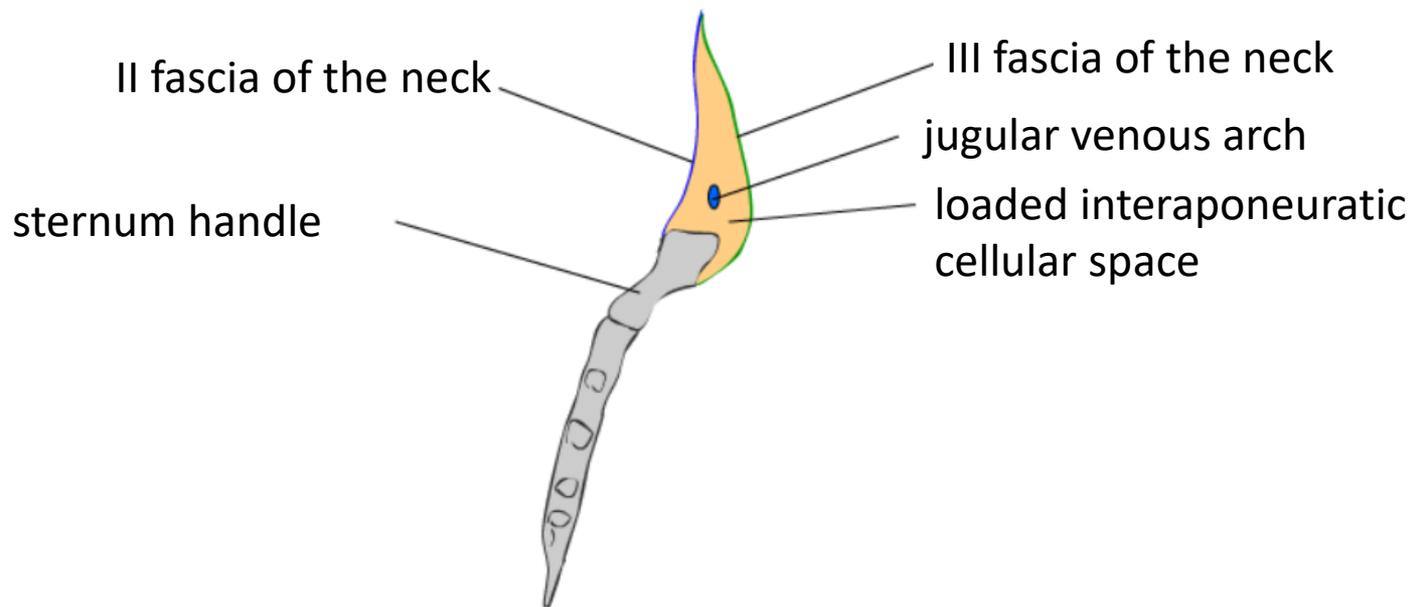
has two leaves – the parietal (forms an outer case for the organs of the neck and the main neurovascular bundle) and the visceral (which envelops the organs of the neck).

- **THE FIFTH FASCIA**

lines the deep muscles of the neck, envelops the cervical nodes of the sympathetic trunk.

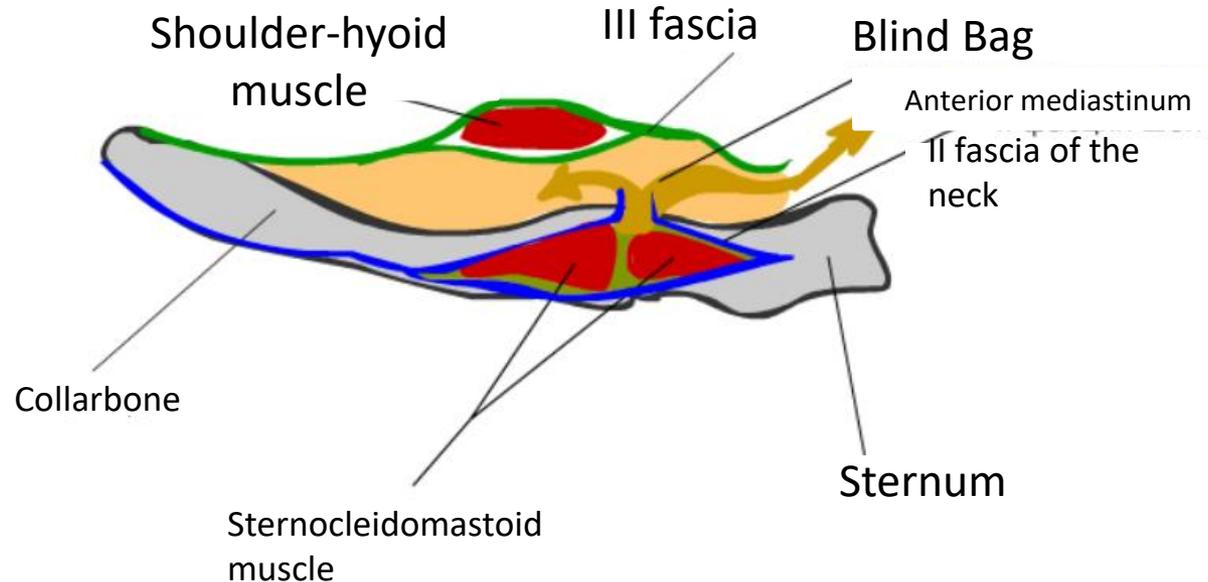
Cellular spaces of the neck and pathways of purulent exudate

- Between the II and III fascia above the jugular venous arch of the sternum is the supra-thoracic interaponeural cellular space. It is reported as a blind sac.



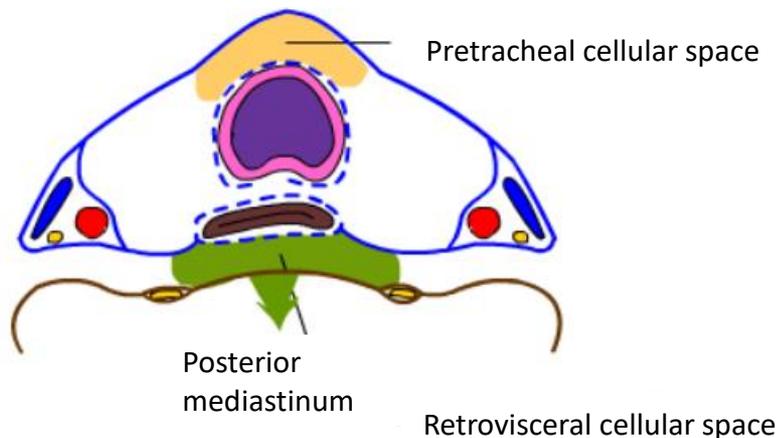
Cellular spaces of the neck and pathways of purulent exudate

2. There is a blind sac behind the sternoclavicular-mastocoid muscle.



Cellular spaces of the neck and pathways of purulent exudate

- 3. On the anterior surface of the trachea, between the parietal and visceral leaves of the IV fascia, is the pretracheal cellular space. It communicates with the anterior mediastinum.
- 4. There is a retrovisceral space behind the esophagus and pharynx between the IV and V fascia. It passes into the fiber of the posterior mediastinum.
- 5. In the lateral triangle of the neck, there is an extensive lateral cellular space. It has a wide communication with the subclavian cellular space, the cellulose of the thoracic, scapular, and axillary areas, and the vascular cleft of the subclavian vessels of the mediastinum.

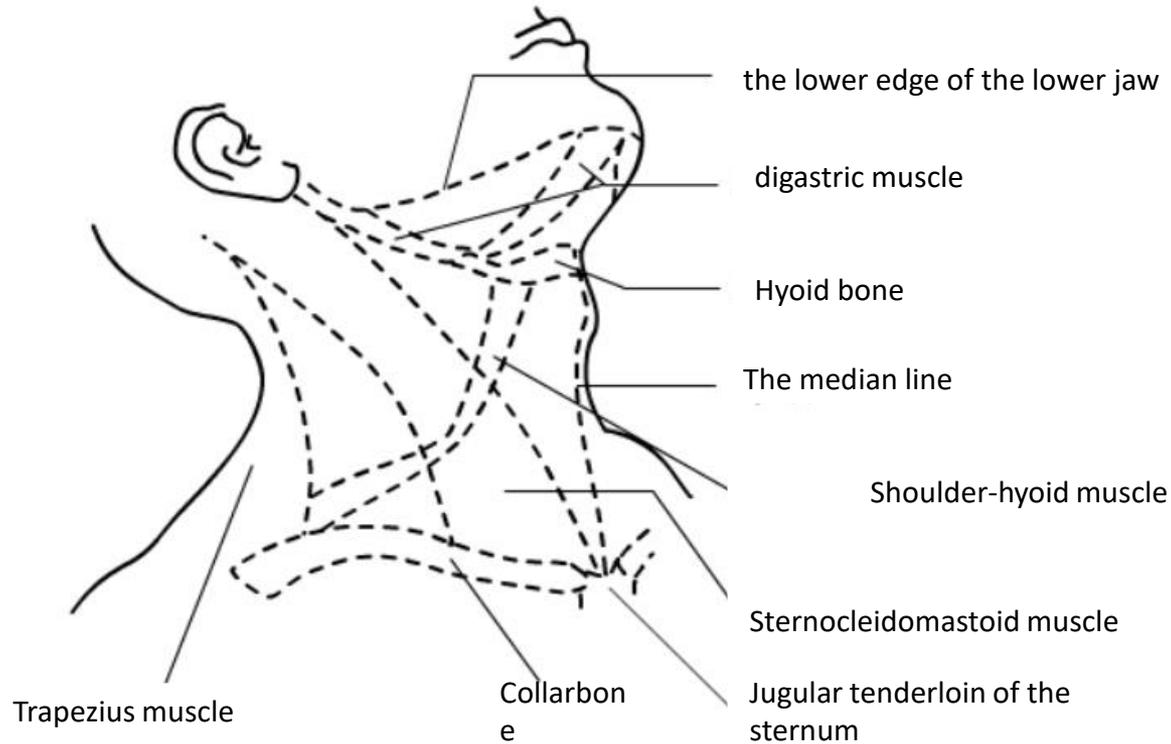


FEATURES OF PURULENT PROCESSES

- 1. In the suprasternal sac, there is a venous arch connecting the superficial veins of the neck on the right and left sides. When opening the phlegmon, unexpected cuts in the veins can lead to an air embolism.
- 2. Erroneous dissection of the posterior wall of the suprasternal sac can lead to the spread of pus into the upper part of the anterior mediastinum.
- 3. The isolation of fiber between the leaves of the 4th fascia is very low, so the generalization of infection in wounds of the esophagus and the posterior wall of the trachea is great.
- 4. The fiber of the interstitial crevices is a favorable environment for microorganisms and quickly undergoes necrosis.
- 5. Phlegmons and hematomas in the neck sharply violate the topographic and anatomical landmarks that could be used to choose the place of a rational incision.

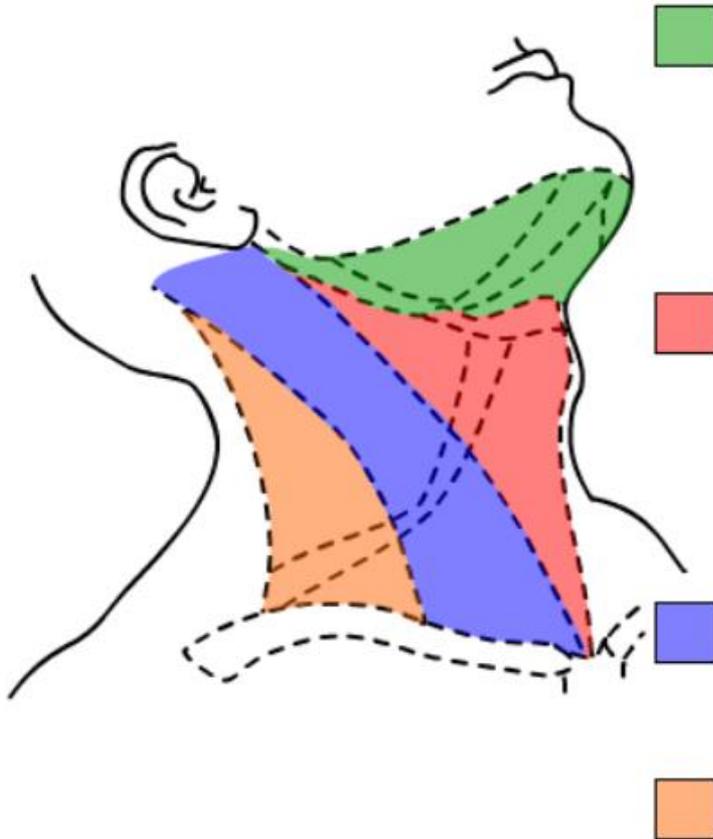
NECK AREAS AND TRIANGLES

LANDMARKS



NECK AREAS AND TRIANGLES

LANDMARKS



SUPRA - LINGUAL

From above – the edge of the lower jaw; Below is a line drawn through the body and the large horns of the hyoid bone; Bilateral – anterior edges of the sternocleidomastoid muscles;

THE SUBLINGUAL

From above is a horizontal line at the level of the hyoid bone; At the bottom is a sternum tenderloin; Bilateral – anterior edges of the sternocleidomastoid muscles;

THE STERNOCLEIDOMASTOID

Corresponds to the contours of the sternocleidomastoid muscle;

LATERAL

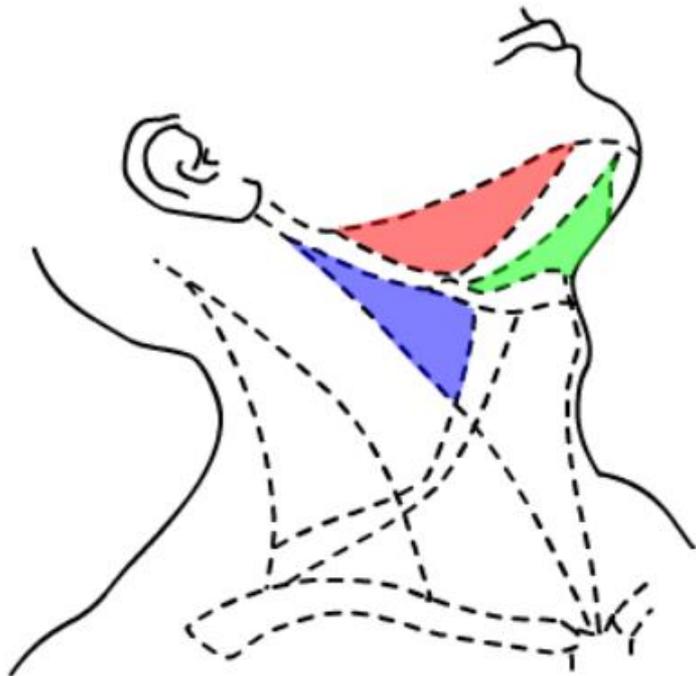
In front – the posterior edge of the sternocleidomastoid muscle;

Behind – the anterior edge of the trapezius muscle;

Bottom – collarbone;

AREAS AND TRIANGLES NECK

TRIANGLES



SUBMANDIBULAR TRIANGLE

From above – the lower edge of the lower jaw;
Posterior and laterally – posterior abdomen of the bicuspid muscle, awl-hyoid muscle;
Anterior and medial – anterior abdomen of the bicuspid muscle;



CHIN TRIANGLE

Between the anterior abdomen of the bicuspid muscles and the hyoid bone;

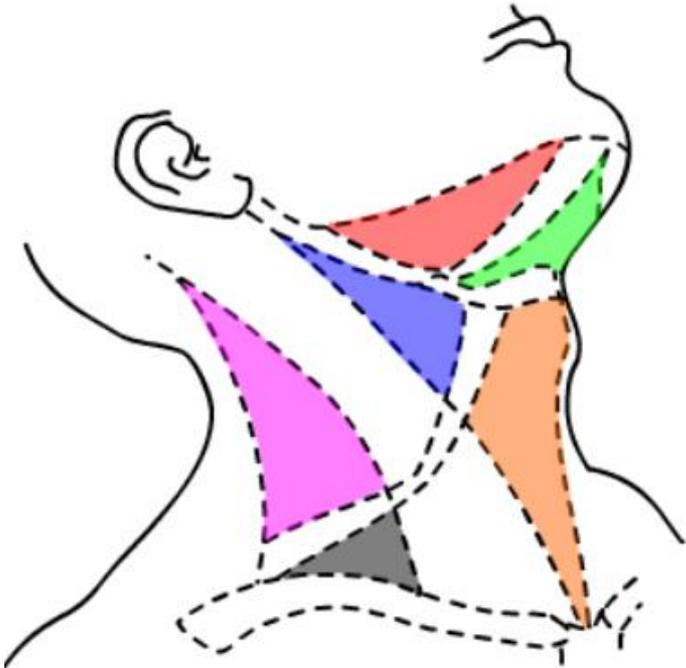


CAROTID TRIANGLE

Medial – upper abdomen of the scapular-hyoid muscle; Lateral – sternocleidomastoid muscle; At the top is the posterior abdomen of the bicuspid muscle;

AREAS AND TRIANGLES NECK

TRIANGLES



SHOULDER-TRACHEAL TRIANGLE



At the top – the body and large horns of the hyoid bone;
at the top and laterally – the upper abdomen of the shoulder-hyoid muscle;
at the bottom and laterally – the sternocleidomastoid muscle, medial-median (white) neck line;
at the bottom, the sternocleid articulation, jugular tendon of the sternum;

THE SCAPULAR-TRAPEZOIDAL TRIANGLE laterally and posteriorly, the anterior edge of the trapezius muscle;
medially and anteriorly—sternocleidomastoid muscle;
at the bottom is the lower abdomen of the scapular-hyoid muscle;



SCAPULOCCLAVICULAR TRIANGLE

Anterior and medial – sternocleidomastoid muscle;
Posterior and lateral – lower abdomen of the scapulo-hyoid muscle;



At the bottom – the upper edge of the clavicle;

LARYNX

Skeletotopia: the upper edge of the V and lower edge of the VI cervix vertebra, the epiglottis reaches the level of the III cervical vertebra;

Syntopia:

in front - the pre-laryngeal muscles of the sublingual region;

bilateral - lateral lobes of the thyroid gland;

back — throat;

at the top is the root of the language;

at the bottom - the transition to the trachea;

Departments:

a) upper (vestibule) - from the epiglottis to the false vocal cords;

b) the middle (interlinking space) - the position of the false and true vocal cords;

c) the lower (sublingual space) - from the vocal folds to the trachea;

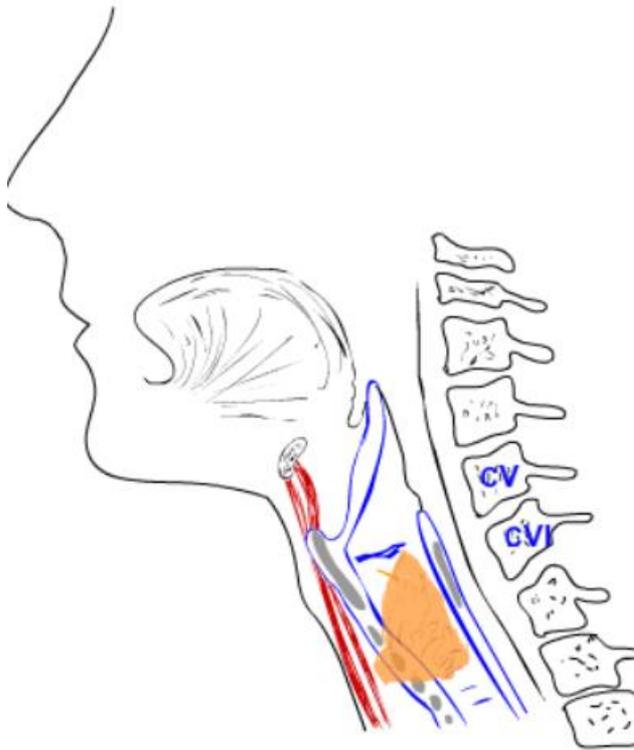
Blood supply: branches of the upper and lower thyroid arteries;

Innervation:

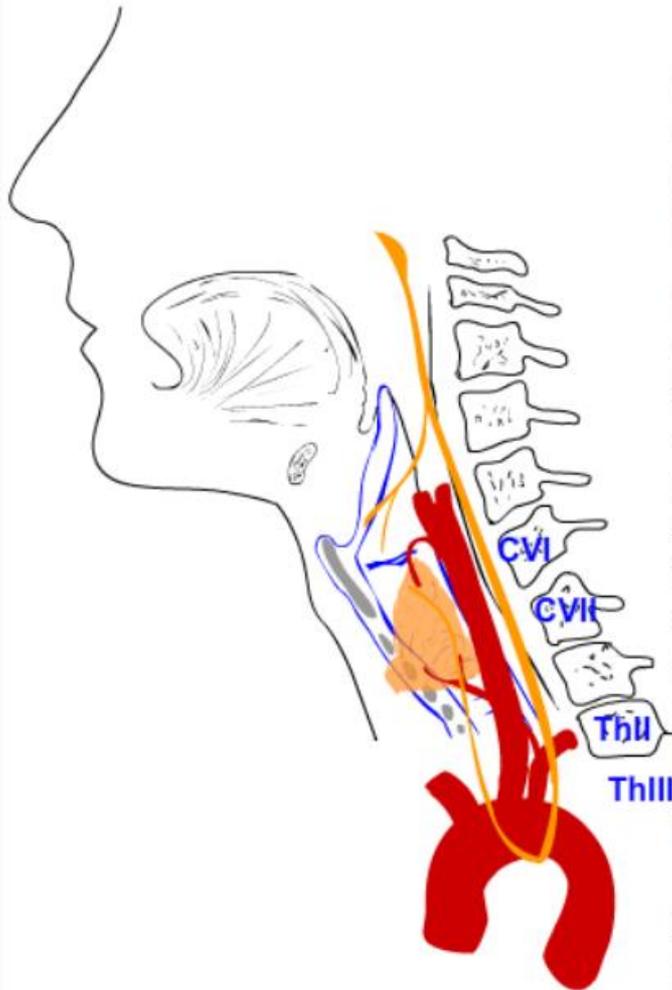
a) upper laryngeal nerve;

b) lower laryngeal nerve;

c) branches of the sympathetic trunk;



TRACHEA



Skeletotopia:

- | Intervertebral disc VI- VII of the cervical vertebrae-
- | Intervertebral disc II - III of the thoracic vertebrae (back);

Syntopia:

- | front (initial section) - isthmus of the thyroid gland;
- | front (end section) - pretracheal cellular space, venous plexus, lymph nodes;
- | bilaterally - thyroid lobes (upper section), common carotid arteries (lower section);
- | behind — esophagus;

Blood supply: lower thyroid arteries;

Innervation: lower laryngeal nerves (recurrent);

Lymph outflow: deep lymph nodes of the neck, Pretracheal, paratracheal;

THYROID

Fascial environment:

- a) own capsule;
- b) Fascial vagina;

Skeletotopia:

the lower edge of the VI cervical vertebra — I thoracic vertebra
(I- III or II- IV cartilage of the trachea);

Syntopia:

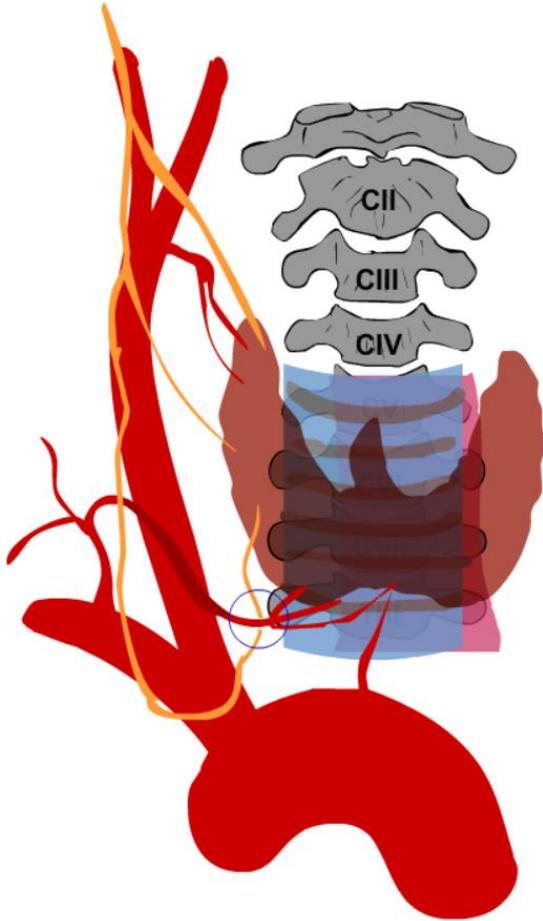
anterior - pretracheal cellular space,
muscles of the sublingual region;
behind - trachea, recurrent laryngeal nerve,
parathyroid glands, esophagus;

Blood supply:

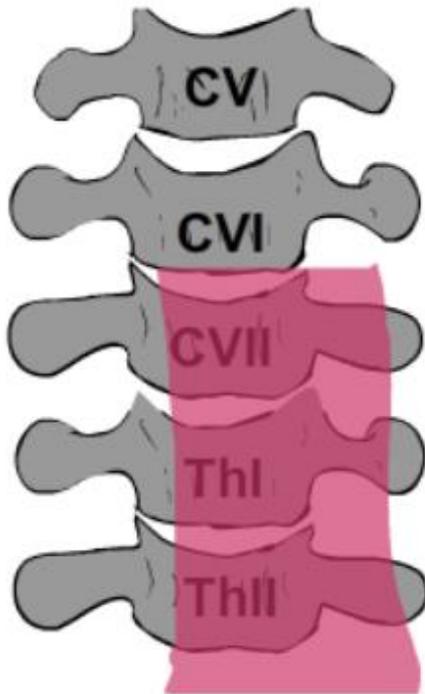
upper thyroid arteries (two);
lower thyroid arteries (two);
thyroid unpaired artery (12%);

Innervation: nerves from sympathetic trunks and
both recurrent laryngeal nerves;

Lymph outflow: to the pretracheal and paratracheal
lymph nodes;



ESOPHAGUS (NECK PART)



Skeletotopia: the lower edge of the VI cervical vertebra (Cricoid cartilage) - II thoracic vertebra (Jugular sternum). Deflected to the left of the spine and trachea.

Length 4.5 - 5 cm;

Syntopia:

Front - trachea;

Behind - cervical vertebrae, long neck muscles, pre-vertebral fascia, retrovisceral

Fiber;

Bilateral - thyroid lobe;

Blood supply: lower thyroid arteries;

Innervation: lower laryngeal (recurrent)

Nerves;

Lymph outflow: to deep cervical lymph

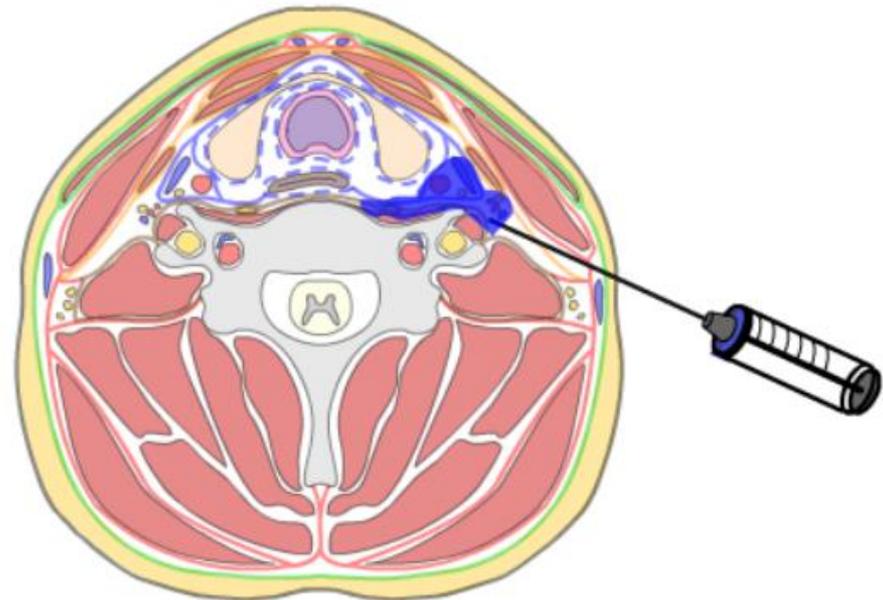
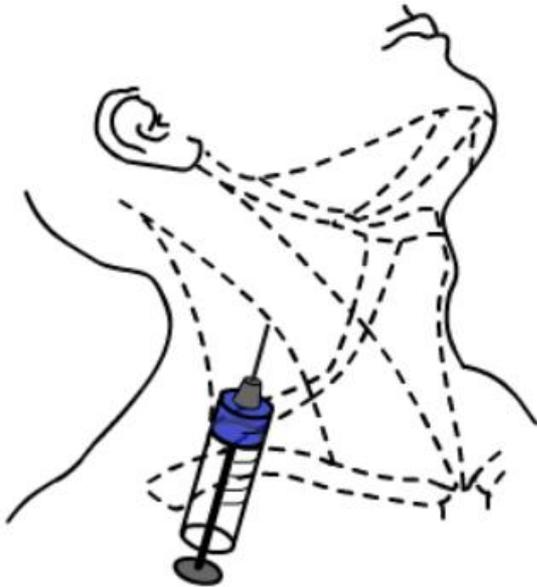
Nodes;

Operations on some neck organs were performed in ancient times. Asclepiades two millennia ago, proposed the opening of the respiratory artery in case of suffocation. This operation was described for the first time in history by Galen, who called it a laryngotomy. There are suggestions that in the IV century AD, Antill opened the trachea with a transverse incision in a patient dying of suffocation. He called the operation he performed a pharyngotomy. For the first time, a documented tracheostomy was performed by an Italian Brassoavola on a patient suffocating as a result of a laryngeal abscess. In 1620, the French surgeon Abico opened the windpipe of a child, saving him from suffocation caused by a foreign body in the upper esophagus. He called the operation he performed a bronchotomy. However, until the beginning of the XX century, reports of tracheostomy were very rare, and only since the first quarter of the XIX century, when croup for laryngeal diphtheria was included in the number of indications for performing this surgical intervention, has the number of publications on the use of tracheostomy has increased significantly. The first effective throat-cutting in Russia was done by a graduate of the St. Petersburg Medical Surgical Academy, Professor V.V. Pelikan, on October 7, 1819. With the help of a thyreoconico-crico-tracheotomy, he extracted the tip of a musical instrument from the patient's trachea. In 1844, N.I. Pirogov performed tracheostomy twice in children with croup. Five years later, V.A. Basov repeated this operation. Since the middle of the XIX century, tracheotomies have been widely used in Russia. In 1866, Watson performed the first complete removal of the larynx when it was affected by syphilis. With laryngeal cancer abroad, Billroth was the first to perform this operation in 1873, in Russia - P.Ya . Multanovsky in 1875. A lot of new and valuable laryngectomy techniques were introduced by domestic surgeons and laryngologists: P.I. Dyakonov, N.M. Volkovich, M.Ya. Harshak, V.I. Voyachek, F.S. Bokstein and others. In the tenth century, the Arab doctor Abul-Kazim first performed the removal of goiter. In 1877, Lister was the first in Europe to excise a goiter under aseptic conditions. In 1933, O.N. Nikolaev developed a method of subtotal subfascial resection of the

VAGOSYMPATHETIC BLOCKADE

Indications. The fight against pleuropulmonary shock during operations on organs enclosed in the anterior cervical triangle, esophagus, and mediastinum. A good effect in pathological processes and wounds in the pharynx and larynx, associated with severe pain.

Needle injection at the posterior edge of the sternocleidomastoid muscle, above its intersection with the external jugular vein. If the contours of the external jugular vein are not visible, then The projection point of the needle injection is determined by the location of the upper edge of the thyroid cartilage. The needle is carried upwards and inwards to the front surface of the cervical bodies vertebrae. Then the needle is pulled away from the spine by 0.5 cm (in order not to get into the pre- raring space) and 40–50 ml of 0.25% Novocaine solution are injected into the fiber located behind the common fascial vagina of the cervical neurovascular bundle. When this manipulation are performed correctly, ptosis, miosis and enopthalmos develop on the performing side.



VAGOSYMPATHETIC BLOCKADE

Indications. The fight against pleuropulmonary shock during operations on organs enclosed in the anterior chest wall has a good effect in pathological processes and wounds in the pharynx and larynx, associated with severe pain.

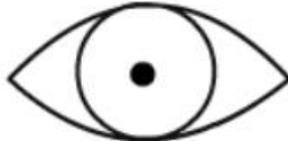
Needle injection at the posterior edge of the sternocleidomastoid muscle, above its intersection with the external jugular vein are not visible, then The projection point of the needle injection is determined by the location of the external jugular vein. The needle is carried upwards and inwards to the front surface of the cervical bodies vertebrae. Then the needle is inserted (not to get into the pre-vertebral space) and 40–50 ml of 0.25% Novocaine solution are injected into the fiber layer of the cervical neurovascular bundle.

The criterion for a successful blockade is the Claude Bernard–Horner triad.

ptosis



myosis



enophthalmos



TRACHEOTOMY (TRACHEOSTOMY)

Opening of the trachea. Emergency surgical intervention.

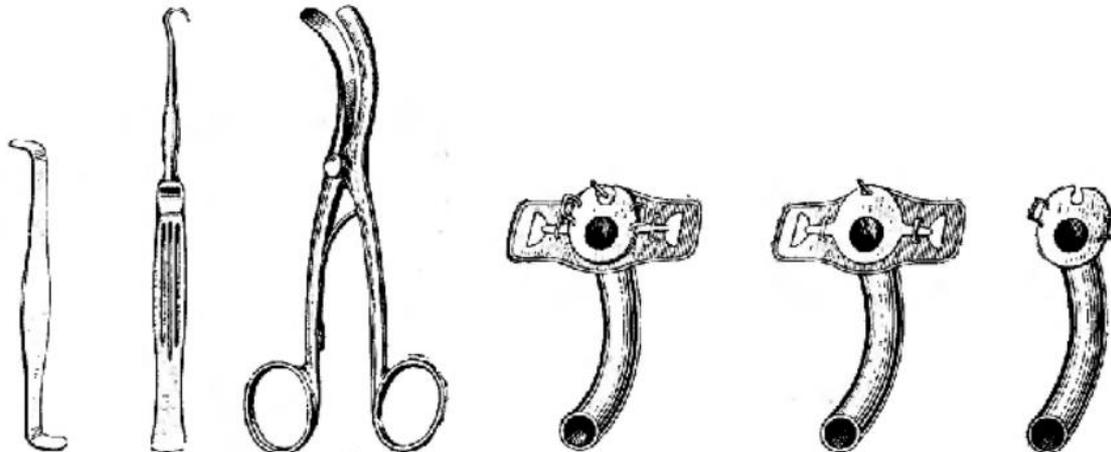
Purpose: to give immediate air access to the lungs, if foreign Bodies enter the overlying parts of the respiratory tract, trachea, main bronchi.

Indications: damage to the larynx and trachea, laryngeal and tracheal stenosis on the background

Of inflammatory diseases and neoplasms, foreign bodies in the larynx And pharynx, stenosis after chemical burns, allergic stenosis.

The main types of tracheotomy: upper - over the isthmus of the thyroid Gland (used in adults); lower - under the isthmus (in children).

Special tools for tracheotomy.



TRACHEOTOMY (TRACHEOSTOMY)

Technique of performing an upper tracheostomy

1. A layered incision of the skin, subcutaneous tissue, superficial fascia and

The white line of the neck 4-6 cm long since the cricoid cartilage down strictly along the median line. **Deviation from**

The median line - damage to the cervical vessels!!!

2. Spread the muscles (sternohyoidei and sternothyroidei), determine the cricoid cartilage and isthmus of the thyroid gland.

3. Dissect

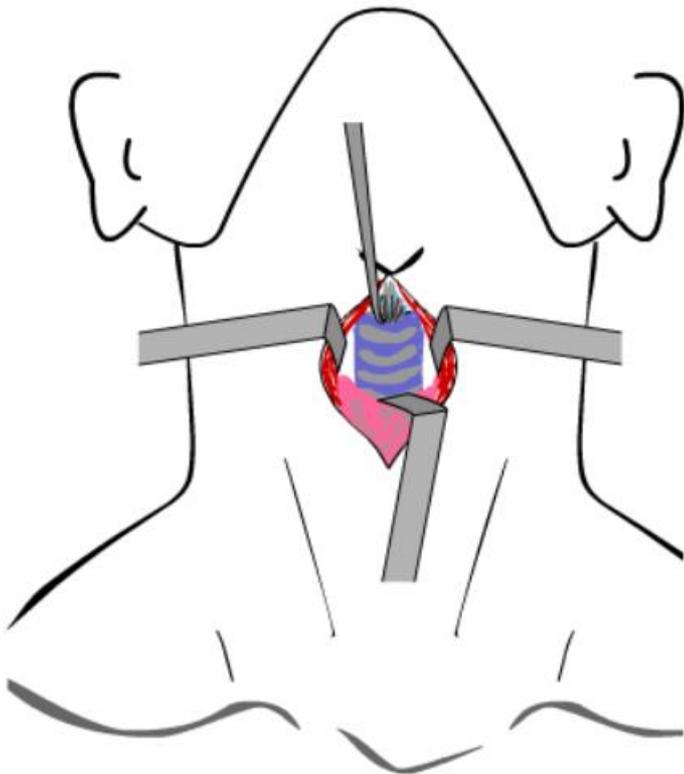
The leaf of the fourth fascia in the transverse direction, with a blunt

hook take the isthmus of the cheek downwards, exposing the upper rings of the trachea.

4. Carefully stop the bleeding

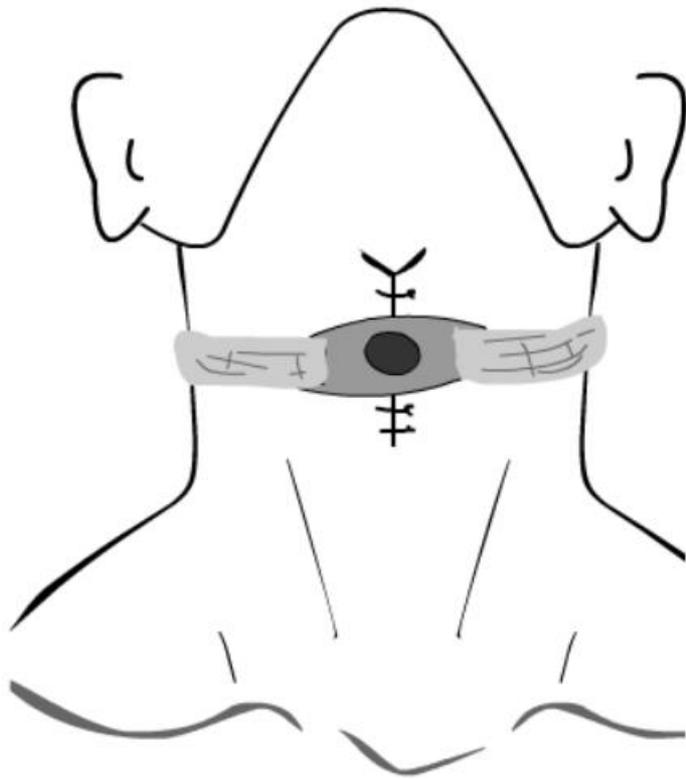
(Insufficient hemostasis before opening the trachea - blood flow in bronchi, asphyxia!!). Fix

The trachea with a single-toothed hook, pull it's up.



TRACHEOTOMY (TRACHEOSTOMY)

Technique of performing an upper tracheostomy



5. With a scalpel blade, limited to 1 Cm from the tip, dissect 2-3 upper cartilages Of the trachea, directing the knife from the isthmus to

The larynx (blade without limitation - damage to the posterior wall of the trachea, esophagus). The length of the incision should correspond to the diameter of the canal.

A small incision - the overlying cartilage is pressed into the lumen; A large incision - Subcutaneous emphysema.

6. After stopping coughing, insert a tracheal dilator into the tracheal cavity.

7. Insert the cannula, placing its flap in The sagittal plane.

8. Remove the tracheorassilator, pushing The cannula into the cavity, turn it so, So that the shield is located in the frontal Plane.

9. Apply stitches to the skin, fix The cannula with a gauze bandage.

OPERATIONAL ACCESSSES ON THE NECK

1. Parallel to the edge of the lower Jaw.

2. Sublingual collar-shaped
To the pharynx.

3. Collar-shaped to the top
Thyroid artery.

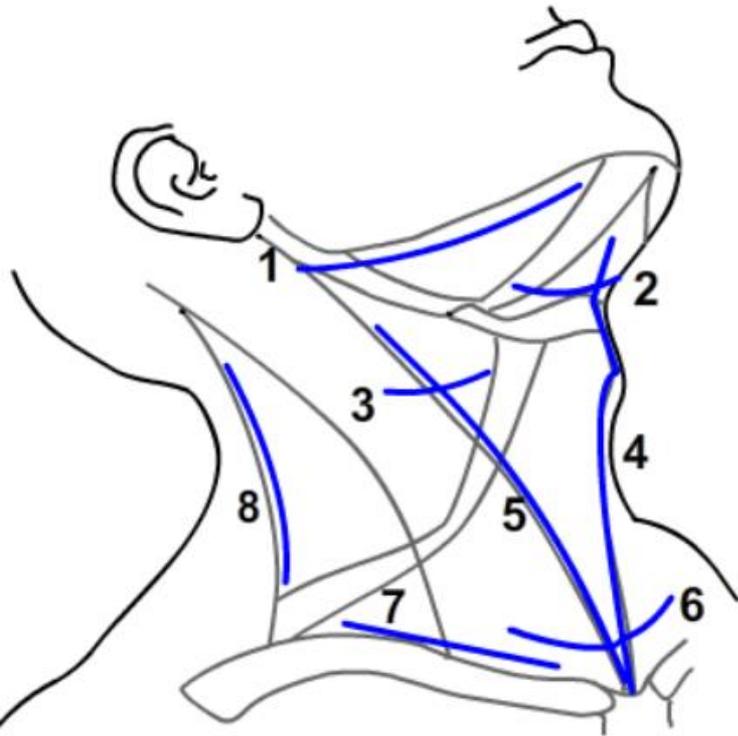
4. Median longitudinal.

5. Along the anterior edge
Of the sternocleidomastoid muscle.

6. Collar-likecollar-like, to the thyroid
Gland.

7. Parallel to the upper edge
Of the clavicle.

8. Along the anterior edge of the trapezius
Muscle.



ACCESS TO THE CERVICAL ESOPHAGUS

1. The skin incision is made along

The inner edge

Of the left sternocleidomastoid muscle from

The jugular tenderloin of the sternum to the upper

The edges of the thyroid cartilage.

2. Dissect the anterior wall

Of the vagina

Of the sternocleidomastoid muscle. The muscle

Is pushed outwards.

3. Dissect the posterior leaf of the vagina,

The third fascia and the parietal leaf

Of the fourth inside of the vessels. The muscle with

The vessels is carefully pushed

Outwards.

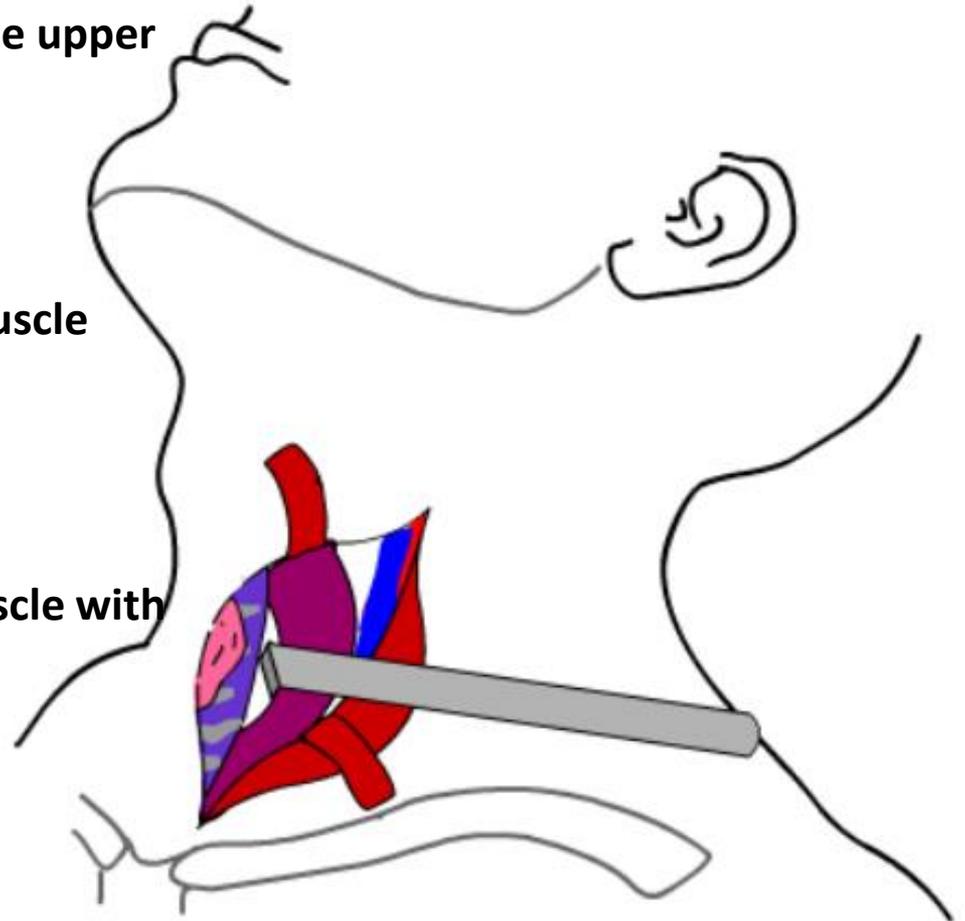
4. The shoulder-hyoid muscle

Is crossed.

5. The left lobe of the thyroid gland, together with the trachea

, is withdrawn inside. Behind the trachea

, the esophagus is determined.



Thanks for your attention!