Topographical Anatomy of the Neck

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Study guide

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This study guide is intended for the students of medical higher educational institutions of IV accreditation level, who study Human Anatomy in the English language.

Навчальний посібник рекомендований для студентів вищих медичних навчальних закладів IV рівня акредитації, які вивчають анатомію людини англійською мовою.

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TOPOGRAPHICAL ANATOMY OF THE NECK

THE NECK

Borders:

The neck is separated from the head by line that passes from the chin along the lower and then the rear border of the body and the branch of the mandible, along the lower border of the external auditory canal and mastoid process, with linea nuchae superior to protuberantio occipitalis externa.

The neck is separated from the chest, upper limb and back by line that passes from incisura jugularis, on the clavicle and scapula, on the acromion, and from it to the spinous processes of VII cervical vertebra.

AREA OF THE NECK

The neck is divided into two sections: anterior cervical region (regio colli anterior), and posterior cervical region (regio colli posterior). The boundary between them is arbitrary rectangle drawn frontally through the transverse processes of the cervical vertebrae. Both compartments are separated from each other by own fascia of the neck.

Anterior cervical region is very important because most surgeries are carried out in that area. A significant number of important anatomical structures is concentrated there: blood vessels**,** upper part of the respiratory tract and digestive tract, vagus nerve, sympathetic trunk, thyroid gland and trunks of brachial plexus.

It is necessary to know bones, muscles and cartilages for identifying projections of organs arrangement, diagnosing disorders, and carrying out operations.

We can palpate the lower border and angle of the mandible, sternal notch, body and greater horn of the hyoid bone, the thyroid and cricoid cartilages of larynx, rings of the trachea and thyroid isthmus.

The submandibular salivary gland and submandibular lymph nodes are located under the border of the mandible.

The common carotid artery pulsates on anterior border of sternocleidomastoid muscle. It is pressed to tuberculum caroticum of VI cervical vertebrae. It is located at cricoid cartilage, where larynx opens into trachea, pharynx into esophagus.

The greater supraclavicular fossa is located immediately above the clavicle

and between trapezoid and sternocleidomastoid muscles. There are brachial plexus and subclavian artery. The subclavian artery should be pressed to first rib at bleeding.

The lesser supraclavicular fossa is an indentation between the pedicles of sternocleidomastoid muscle. It is Gueneau de Mussy point, place of phrenic nerve projection.

The external jugular vein is located at the outer surface of sternocleidomastoid muscle.

The projection of outlet of sensitive branches of the cervical plexus is in the middle of posterior border of sternocleidomastoid muscle.

TRIANGLES OF THE NECK

There are three triangles in the anterior part of the neck: anterior triangle and 2 posterior ones.

Anterior triangle of the neck

Borders:

- superior – mandibula;
- inferior – manubrium of sternum;
- lateral – anterior borders of the sternocleidomastoid muscle.

Posterior triangle of the neck

Borders:

- anterior – posterior border of the sternocleidomastoid muscle;
- posterior – anterior border of the trapezius;
- inferior – clavicle.

Anterior triangle of the neck is divided into regio suprahyoideum and regio infrahyoideum by the horizontal line passing through the body of the hyoid bone.

There are 2 submandibular triangles and submental one in regio suprahyoideum.

Regio suprahyoideum

Borders:

- superior – inferior border of the mandible;
- inferior – the body of the hyoid bone;
- lateral – anterior belly of the digastric muscle.

Submandibular triangle

Borders:

- superior – inferior border of the mandible;
- posterior – posterior belly of the digastric muscle;

- anterior – anterior belly of the digastric muscle.

Submental triangle

Borders:

- posterior – by the anterior belly of the digastricus;
- anterior – by the midline of the neck between the mandible and the hyoid bone;
- inferior – by the body of the hyoid bone while its floor is formed by the mylohyoideus muscle.

Anterior triangle of the neck is divided into 2 medial triangles by midline.

Medial triangle

Borders:

- superior – inferior border of the mandible;
- posterior – anterior borders of the sternocleidomastoid muscle;
- medial – midline.

There are 3 triangles in medial triangle: submandibular triangle, carotid triangle, muscular triangle.

The boundaries of the *submandibular triangle (trigonum submandibularis)* are:

- superior – body of the mandible;
- anterior – anterior belly of the digastric muscle;
- posterior – posterior belly of the digastric muscle.

The *carotid triangle (trigonum caroticum)* of the neck has the following boundaries:

- superior – posterior belly of the digastric muscle;
- lateral – middle border of the sternocleidomastoid muscle;
- inferior – superior belly of the omohyoid muscle.

The boundaries of the *muscular triangle (trigonum omotracheale)* are:

- medial – imaginary midline of the neck;
- superior – superior belly of the omohyoid muscle;
- inferolateral – inferior portion of the sternocleidomastoid muscle.

The omohyoid muscle splits the posterior triangle of the neck into two parts: superior and inferior ones.

The superior part is larger and is called the occipital triangle (trigonum omotrapezoideum). The occipital triangle is crossed by the accessory nerve.

The inferior triangle is known as the subclavian triangle (or supraclavicular triangle, omoclavicular triangle) (trigonum omoclaviculare). It is called the subclavian triangle as it contains the distal portion of the subclavian artery.

The boundaries of the *occipital triangle (trigonum omotrapezoideum)* are:

- inferior – the omohyoid muscle;
- anterior – posterior border of the sternocleidomastoid muscle;
- posterior – trapezius.

The *subclavian triangle* of the neck (trigonum omoclaviculare) has the following boundaries:

- superior − the omohyoid muscle;
- inferior – the clavicle;
- anterior – posterior border of the sternocleidomastoid muscle.

Sternocleidomastoid region

The region is covered by the sternocleidomastoid muscle (here is dissected). There are well developed fascias in the neck.

FASCIAS OF THE NECK

Fascia is a layer of fibrous tissue that surrounds muscles, vessels and nerves. There are several layers of fascia which act to support and compartmentalise the present structures in the neck. Cellular spaces are between fascial sheets.

The classification of fascias of the neck by V. N. Shevkunenko is very popular in topographic anatomy.

The first fascia, *superficial cervical fascia (fascia colli superficialis)*, is a part of the superficial fascia of the body. The superficial cervical fascia lies between the dermis and the deep cervical fascia. Superficial cervical fascia is a layer of fibrous tissue that surrounds m. platysma and goes to face and chest.

The second fascia is investing layer of deep cervical fascia (lamina superficialis fascia colli propria). The investing layer is the most superficial of the deep cervical fascia. It surrounds all the structures in the neck. It splits into two sheets where it meets the trapezius and sternocleidomastoid muscles. It begins from spinous processes of the cervical vertebrae and lig. nuchae. From below fascia is attached to the front border of the sternum and clavicle. At the top it is attached to the linea nuchae superior, processus mastoideus, the angle of the mandible. It continues in fascia parotideomasseterica. In the submandibular triangle of the neck fascia splits to enclose the submandibular gland.

The third fascia is the deep layer of deep cervical fascia or pretracheal layer of deep cervical fascia, or aponeurosis omoclavicularis, or aponeurosis Richer (lamina profunda fascia colli propria). It extends from the hyoid to the manubrium sterni and the clavicle. It encloses the infrahyoid muscles

(sternohyoid, sternothyroid, omohyoid, thyrohyoid) and is laterally bent around the omohyoid muscles. The white line of the neck is formed by the second and the third fascia in front along the midline of the neck.

The fourth fascia is fascia endocervicalis or visceral part of the pretracheal layer. It consists of visceral and parietal layers. *The visceral layer* encloses the larynx, trachea, pharynx, esophagus, thyroid and parathyroid gland. Each organ is separately enclosed and has its own capsule. *The parietal layer* forms common capsule to all internal organs of the neck. The parietal layer forms carotid sheath. The content of the carotid sheath is:

- common carotid artery (which bifurcates within the sheath into the external and internal carotid arteries);
- internal jugular vein;
- vagus nerve;
- cervical lymph nodes.

It is attached anteriorly to the pretracheal and posteriorly to the prevertebral fascias.

The fifth fascia is prevertebral fascia. The prevertebral fascia covers the vertebral column and its associated muscles (scalene, prevertebral, and deep muscles of the back − m. longus colli and m. longus capitis.). It has attachments along the anteroposterior and superoinferior axes:

- superior − attaches to the base of the skull;
- anterior − attaches to the transverse processes and vertebral bodies of the vertebral column;
- posterior − attaches along the ligamentum nuchae;
- inferior − fuses with the endothoracic fascia of the ribcage.

The prevertebral fascia covers the brachial plexus and subclavian artery as they leave the neck forming the axillary sheath.

An important feature of cervical fascia is the fact that they are strongly associated with the walls of the veins. It causes air embolism through injured neck veins.

SPACES OF THE NECK

There are cellular spaces between the fascias of the neck. It is necessary to know the topography of cellular spaces for the drainage.

1. *Suprasternal fascial space (spatium interaponeuroticum suprasternale)* is located between the second and third fascias of the neck above the jugular notch of the sternum. Content of the space is jugular venous arch. Its arch connects anterior jugular vein.

Incision: along the border of the jugular notch of sternum manubrium.

2. *Retrosternocleidomastoid (Gruber's) cul-de-sac (saccus caecus retrosternocleidomastoideus)* is located laterally from suprasternal space, between II and III fascia, behind the sternocleidomastoid muscle. Inferior border is clavicle. The content of the cul-de-sac is adipose tissue, lower part of v. jugularis anterior, lymph vessels and nodes.

Incision: parallel to the jugular notch of sternum manubrium.

3. *The sternocleidomastoid fascial space (spatium sternocleidomastoideus)*. The sternocleidomastoid fascial space is located within the second (investing) fascia of the neck. The content of the space is fatty tissue and lymph nodes.

Incision: along the front and rear borders of the sternocleidomastoid muscle.

4. *The sac of the submandibular gland (saccus gl. submandibularis)* is located between the layers of the second fascia. The content of the space is submandibular salivary gland, submental artery/vein, facial artery/vein and lymph nodes.

○ Anterior element of the peripharyngeal fascial spaces (continuous with the lateral pharyngeal space. Infection under the tongue and the floor of the mouth can fill the submandibular space and pass posteriorly to the lateral pharyngeal space).

○ Limited above by oral mucous membrane and the tongue (lingual mucosa).

○ Inferior boundary is the superficial layer of cervical fascia (suprahyoid deep investing fascia) as it extends from the hyoid bone to the mandible.

○ Posteriorly – continuous with the lateral pharyngeal space.

○ Along the facial artery − continuous with the carotid sheath.

Submandibular phlegmons have odontogenic origin. The infection enters the submandibular lymph nodes through the affected teeth. So, adenophlegmon is formed.

Incision: along the mandible about 1.5 − 2.0 cm under it.

5. *Carotid sheath (spatium vasonervorum)*. The parietal layer of fourth fascia forms carotid sheath. The content of the carotid sheath is:

- the common carotid artery as well as the internal carotid artery;
- internal jugular vein;
- the vagus nerve (CN X);
- the deep cervical lymph nodes.

○ It lies anterolateral to the cervical sympathetic trunk, behind the

sternocleidomastoid muscle. The sheath blends with the thyroid fascia anteromiddlely and with the deep surface of sternocleidomastoid anterolaterally.

○ Posteriorly it is attached to prevertebral fascia along the tips of the transverse processes of vertebra.

○ It ends at the base of the skull where it attaches around the jugular foramen and carotid canal. It ends at the base of the skull where the internal carotid artery and internal jugular vein go their separate ways.

○ Inferiorly, the carotid sheath fuses with scalene fascia, adventitia of great vessels, and the fibrous pericardium.

○ Superiorly, it is attached to parapharyngeal space.

Incision: along the anterior border of the sternocleidomastoid muscle. The sternocleidomastoid muscle is allocated out. The drainage − vinyl chloride tube is injected into cavity wounds.

6. *Previsceral space (spatium previscerale)* is located between the sheets of the fourth fascia from the level of the hyoid bone to the manubrium of sternum. Part of the space is called pretracheal space. There are lymph nodes, thyroid ima artery (from truncus brachiocephalicus), part of the plexus venosus thyroideus impar (vv. thyreoideae inferiores), truncus brachiocephalicus and a. carotis communis dextra (from truncus brachiocephalicus) and thymus in children.

Incision: a transversal cut between the inner sides of the sternocleidomastoid muscles about 3.0 − 4.0 cm above *incisure* (*collarlike* section by Kocher).

7. *Retrovisceral space (spatium retroviscerale)* is located between the visceral fascia (its buccopharyngeal layer) and the prevertebral fascia of the neck, behind gullet and pharynx. There are the internal carotid artery, vagus, glossopharyngeal and accessory nerve and the hyoid bone which is located in the rear compartment of the space.

Retrovisceral space is divided into two parts by sagittal aponeurosis from the skull base to CVI vertebra. It is separated from parapharyngeal space by aponeurosis pharyngoprevertebralis. Abscesses of retrovisceral space are often one-sided due to median and lateral aponeuroses. Infections in this space can spread into the posterior mediastinum. Abscesses of retropharyngeal space may be accompanied by asphyxia.

Incision: through the oral cavity.

SUBMANDIBULAR TRIANGLE

The submandibular triangle is divided by the inferior border of the mandible from above and the anterior and posterior bellies of the digastric muscle from below.

Layerwise structure of the submandibular triangle

It is composed of skin (thin, mobile, covered with hair), superficial fascia enclosing platysma muscle, fat and the branches of n. transversus colli. The platysma muscle begins from fascia pectoralis et deltoidea on the second rib. It is attached to the border of the mandible and innervated by r. colli n. facialis.

The second fascia of the neck forms the sac of the submandibular gland. It is divided into two sheets. Superficial sheet covers the surface of gland. It is attached to the border of the mandible. Deep sheet lines the inner surface of gland. It is attached to the linea mylohyoidea mandibulae. The gland is located in fovea submandibularis.

R. marginalis mandibulae of n. facialis, v. facialis (v. submentalis), a. facialis (middlely of v. facialis) are located under the second fascia. The facial artery, a branch of the external carotid artery, enters the submandibular triangle under the posterior belly of the digastric muscle and under the stylohyoid muscle. It bends round the gland from above and behind. Facial artery branches into a. submentalis, a. palatina ascendens to the palate and tonsils and rr. glandulares to the gland; n. mylohyoideus, branch of n. alveolaris inferior from n. mandibularis which innervates the anterior belly of m. digastricus and m. mylohyoideus.

The submandibular lymph nodes (nodi lymphatici submandibulares) are located in adipose tissue. They collect lymph from the chin, upper and lower lips, cheeks, nose, from the teeth and gums, palate, tongue, submandibular and sublingual salivary glands.

The submandibular lymph nodes receive afferent channels from the submental nodes, the oral cavity and the anterior parts of the face. Afferent channels drain primarily into the jugulodigastric, jugulocarotid and jugulo-omohyoid nodes of the chain accompanying the internal jugular vein (deep cervical chain). A few channels pass on the way of the subparotid nodes to the spinal accessory chain. It is important to remember that the skin should be incised 2 cm below the mandibular angle to avoid injury of a. et v. facialis and marginal branch of the facial nerve.

Submandibular salivary gland (glandula submandibularis) is surrounded by the second fascia of the neck. But their connection is not tight. The upper part of the gland is adjacent to the periosteum of the mandible. It is located

in the fovea submandibularis. Submandibular salivary gland is adjacent to:

- from below − m. digastricus;
- from behind − parotid salivary gland;
- medially − m. mylohyoideus and m. hypoglossus.

Gland has outgrowths. Posterior outgrowth reaches m. pterygoideus medialis. Anterior outgrowth is located parallel to Wharton's duct and penetrates the gap between the m. mylohyoideus and m. hyoglossus. Anterior outgrowth connects the floor of the mouth with submandibular gland and spreads the pus.

Blood supply of the gland: rr. glandulares with a. facialis, a. sublingualis with a. lingualis.

Venous outflow: from v. sublingualis into v. lingualis and v. jugularis interna.

Innervation: secretory fibers of chorda tympani, sympathetic nerves of plexus caroticus externus, fibers of n. lingualis.

Lymph outflow: into nodi lymphatici submandibularis. (Vessels fall into deep cervical nodes).

The anterior outgrowth and Wharton's duct are located under deep sheet of the second fascia of the neck, penetrate the gap between m. mylohyoideus and m. hyoglossus under the mucous membrane of the mouth and open into caruncula sublingualis. The submandibular (Wharton's) duct lies below the lingual nerve above the hypoglossal nerve.

It is important to remember topography of three nerve trunks: lingual, hypoglossal nerve and marginal branches of the facial nerve. Lingual and hypoglossal nerves are arched. Their concave sides are faced upwards.

LINGUAL TRIANGLE (OF PYROGOV)

For the purpose of the lingual artery ligation in case of bleeding from the tongue or before some operations on it, the boundaries of the lingual triangle must be defined. This triangle is located within the submandibular triangle. The boundaries of the submandibular triangle (trigonum submandibularis) are:

- superior – n. hypoglossus and v. lingualis;
- anterior – free rear border of m. mylohyoideus;
- posterior and inferior – tendon of the digastric muscle.

Fibers of m. hyoglossus are divided for surgical exposure of artery. And under it a. lingualis is located on the middle constrictor of the pharynx.

CAROTID TRIANGLE

The boundaries are:

- lateral: sternocleidomastoid muscle;
- middle: superior belly of omohyoid muscle;
- superior: posterior belly of digastric muscle;
- floor: hyoglossus muscle, inferior constrictor muscle of pharynx, thyrohyoid muscle, longus capitis muscle and middle constrictor of pharynx;
- roof: investing layer of deep cervical fascia.

The skin is thin, mobile, covered with hair. There are n. transversus colli of cervical plexus and the first fascia of the neck and m. platysma in the subcutaneous tissue.

N. transversus colli, rr. colli n. facialis and v. jugularis externa are located between the first and second fascia in adipose tissue. V. jugularis externa was formed from the merger of v. occipitalis and v. auricularis posterior. It has anastomosis with v. retromandibularis and flows into v. subclavia. External jugular vein is fixed to the fascia. That's why it can cause air embolism.

Under parietal sheath of the second fascia of the neck is located carotid sheath. The content of the carotid sheath is:

- the common carotid artery;
- internal jugular vein;
- the vagus nerve (CNX).

○ It lies laterally to the sternocleidomastoid muscle and medially to the organs of the neck.

○ Inferiorly − the carotid sheath fuses with mediastinum.

○ Superiorly − it is attached to parapharyngeal space.

In the area of carotid triangle are located the following elements of neurovascular bundle:

- externally − internal jugular vein;
- deeper, inwards − common carotid artery;
- between them − vagus nerve.

The internal jugular vein is a paired vein collecting the blood from the brain cranial cavity. It begins in the area of foramen jugulare. It is a continuation of the sigmoid sinus.

Deep lymph nodes of the neck are placed throughout distance from the jugular foramen to the apertura thoracis superior outside and behind the internal jugular vein. Submental and submandibular lymph vessels and nodes flow to deep lymph nodes. The nodus lymphaticus jugulodigastricus is the most important of them. It lies at the chiasm of internal jugular vein with

posterior belly of digastric muscle. The nodus lymphaticus jugulodigastricus collects lymph from the posterior third part of the tongue.

The jugular trunk, truncus jugularis is formed from drainage vessels of deep cervical lymph nodes. It is placed behind the internal jugular vein. The jugular trunk falls into the venous angle on the right and into the ductus thoracicus on the left.

There are intracranial and extracranial tributaries of the internal jugular vein. The intracranial are the dura mater sinuses and veins of the brain that flow into them: vv. cerebri, veins of the cranial bones − vv. diploicae, veins of the ear − vv. labyrinthi, veins of the orbit − vv. ophthalmicae and veins of the dura mater − vv. meningeae. V. facialis communis, v. lingualis, v. thyreoidea superior, vv. pharyngeae flow into v. jugularis interna within the limits of carotid triangle. Top of the ansa cervicalis, hypoglossal nerve and carotid artery are located under the vein.

N. hypoglossus is located below the posterior belly of digastric muscle. N. hypoglossus crosses the internal and external carotid arteries. Radix superior passes from descending part of the arc of n. hypoglossus. This branch goes down along the outer surface of a. carotis interna. Then it goes down along the outer surface of the common carotid artery and participates in forming ansa cervicalis.

Common carotid artery is located deeper and inward than internal jugular vein. It is located in sternocleidomastoid region. Common carotid artery enters into the carotid triangle at the middle of the thyroid cartilage. Common carotid artery rises almost vertically from the apex of the carotid triangle on the bisector of the angle formed by sternocleidomastoid muscle and superior belly of the omohyoid muscle. Common carotid artery is placed laterally from the larynx and separated from it by loose tissue. Here the artery is not covered by muscles (except platysma). Its pulsation is well defined here, even at terminal conditions. This part of the vessel is used for introducing drugs for carotid angiography.

Common carotid artery is divided into external and internal carotid arteries at the upper border of the thyroid cartilage. External and internal carotid arteries change their position. In typical cases, the external carotid artery has the most forward position, while the internal carotid artery lies behind and a little bit laterally from the previous one. The internal carotid artery is topographically divided into four sections: cervical, canal (the channel is in the temporal bone), cavernous (lies in cavernous venous sinus) and intracranial.

The cervical part of internal carotid artery has length from bifurcation of the common carotid artery to the external opening of the channel. It passes in the posterior part of parapharyngeal space. It is accompanied by n. glossopharyngeus, n. vagus, n. accessorius and n. hypoglossus. Radix superior n. hypoglossus passes along the anterior surface of the artery. Internal jugular vein is located outside of the internal carotid artery. The internal carotid artery does not have branches in the cervical part. It must be ligated for hemostasis at operations on the tongue and upper jaw. Therefore, there is a need to distinguish the external carotid artery from the internal one.

Their features are:

1. A. carotis externa has branches on the neck, and a. carotis interna does not have them.

2. A. carotis externa is located medially and anteriorly; a. carotis interna – laterally and posteriorly.

3. We should check pulsation of a. temporalis superficialis or a. facialis at the anterior border of m. masseter during imposing clips on a. carotis externa.

If external carotid artery is clamped, the pulse disappears. Ligation of the internal carotid artery causes cerebral circulation disturbance. The external carotid artery is located from the common carotid artery bifurcation to the cervical articular process of the lower mandible. It is divided into its terminal branches: a. maxillaris and a. temporalis superficialis. There are two compartmens, the boundaries of which are the hypoglossal muscle and posterior belly of m. digastricus. The first part of the external carotid artery is located in the carotid triangle. The second part is located in the parotid salivary gland.

The branches of external carotid artery are as follows:

1. The superior thyroid artery arises from the external carotid artery just below the level of the greater cornu of the hyoid bone and ends in the thyroid gland. It has anastamoses with a. thyreoidea inferior of truncus thyreocervicalis and the artery of the opposite side.

2. The lingual artery arises from the a. thyreoidea superior on the level of the greater cornu of the hyoid bone. It is located in Pirogov triangle between the m. hyoglossus and m. constrictor pharyngis medius.

3. The facial artery arises above lingual artery, under the posterior belly of m. digasricus in submandibular triangle.

Three branches that make the group of posterior branches depart from the posterior semicircle of external carotid artery. They include: the occipital, sternocleidomastoid artery and posterior auricular artery.

4. The occipital artery arises from the external carotid artery at the same

level with the facial artery.

5. The sternocleidomastoid artery goes to the sternocleidomastoid muscle.

6. The posterior auricular artery arises over the occipital artery.

7. The ascending pharyngeal artery lies just superior to the bifurcation of the common carotid artery. It supplies the pharynx and the auditory tube.

The carotid body is located within the neck, and in close approximation to the carotid bifurcation. The carotid body is made up of sinus carotidus and glomus carotidum. The sinus carotidus is a part of the internal carotid arteries. The numerous baroreceptors are located there. They regulate blood pressure and respiration.

The glomus caroticum consists of a number of chemoreceptors and supporting cells which detect changes in the composition of blood. It consists of chromaffin cells. The carotid body isn't bigger than a rice grain.

The carotid body predominantly detects the partial pressue of oxygen, but is also sensitive to the partial pressure of CO_2 and pH and temperature.

The numerous branches of glossopharyngeal and vagus nerves and sympathetic trunk are located near the carotid body. R. sinus carotidus (Hering's nerve), part of the glossopharyngeal nerve, arises from carotid sinus and carotid body. Reflexes of the carotid body influence on the activity of the respiratory centre. At stimulation of carotid zone occurs contraction of bronchioles.

Blood antigens influence on the chemoreceptors of the carotid body. They form a flow of pathological impulses. They move along glossopharyngeal nerve and vagus nerve branches, reach their nuclei and improve their tone. Hypertonicity of the vagus nerve causes spasms of smooth muscles and increases the secretion of bronchial glands.

The operation of Nakayama – resection of carotid body is performed at severe bronchial asthma. Adventitia of all three carotid arteries in length of 1,5–2 cm away from the bifurcation with carotid sinus. Is removed surgeons make denervation of carotid zone. Removing and denervation of carotid sinus zone interrupt reflexive zone, eliminate violations of respiratory center and normalize breathing.

The vagus nerve is located between v. jugularis interna and a. carotis interna, below a. carotis communis.

There are the following branches in the carotid triangle:

1) rr. pharyngei form plexus pharyngeus together with the branches of *n. glossopharyngeus* and branches of sympathetic trunk. *Plexus pharyngeus* innervates muscles and mucous membrane of the pharynx;

2) the superior laryngeal nerve arises from the middle of the ganglion

nodosum and on its way receives a branch from the superior cervical ganglion of the sympathetic trunk. It descends from the side of the pharynx behind the internal carotid artery and divides into two branches: external laryngeal nerve and internal laryngeal nerve.

The external laryngeal nerve descends on the larynx beneath the sternothyroid muscle to supply the cricothyroid muscle.

3) rr. cardiaci superiores arise from the vagus nerve lower than the superior laryngeal nerve. They form plexus cardiacus together with the rr. cardiaci of sympathetic trunk.

Elias von Cyon and Carl Ludwig revealed afferent fibers in the vagus nerve. Its stimulation induces a brainstem reflex that slows the heartbeat, dilates the peripheral vessels, and lowers blood pressure (Cyon nerve). Parasympathetic innervation of the heart is partially controlled by the vagus nerve. To put it more exactly, vagal and spinal ganglionic nerves stimulate the lowering of the heart rate.

The sympathetic trunk, truncus sympathicus is located deeper than neurovascular bundle, under the fifth fascia of the neck.

Superior cervical sympathetic ganglion is covered by internal carotid artery. The vagus nerve is located laterally from it. The proximity of vagus nerve and sympathetic trunk explains the positive effect of cervical vagosympathetic novocaine blockade.

STERNOCLEIDOMASTOID REGION

Borders of the region correspond to sternocleidomastoid muscle.

Skin is thin, mobile. It is innervated by the transverse cervical nerve and the supraclavicular nerves. Branches of the transverse cervical nerve and platysma are located in the subcutaneous tissue.

Between the first and second fascia pass:

1. The external jugular vein which anastomoses with v. retromandibularis. It passes perpendicularly down the neck, in the direction of a line drawn from the angle of the mandible to the middle of the clavicle at the posterior border of the sternocleidomastoid muscle and empties into the venous angle.

2. The transverse cervical nerve turns around the posterior border of the sternocleidomastoid muscle around its middle. It innervates the skin of the neck in the area of the anterior triangle.

3. The great auricular nerve goes up to the angle of the mandible, crosses sternocleidomastoid muscle. It innervates the skin of the ear and skin in the area of the parotid salivary gland.

4. The lesser occipital nerve goes up along the posterior border of the

sternocleidomastoid muscle. It innervates the skin of the occipital area.

5. The supraclavicular nerves go down. They innervate the skin of the sternocleidomastoid area, skin of posterior cervical triangle and skin of subclavian and deltoid areas.

Cervical plexus block

Indications: surgical interventions are carried out on the anterior or lateral surface of the neck. The anesthetic agents are injected at several points along the posterior border of the sternocleidomastoid muscle. The main injection site is at the joint of its superior and middle thirds, around the nerve point of the neck (Erb's point). The involved nerve root is C6.

The needle is inserted perpendicular to the skin. At this point, the needle is withdrawn 1 to 2 mm and firmly stabilized, and 15−20 ml of 0.5 % solution of Novocain is injected.

Lymph nodes that collect lymph from the neck are located along the anterior and posterior border of the sternocleidomastoid muscle. The sternocleidomastoid muscle is located in the fascial sheath. This fascial sheath is formed by the second fascia of the neck. The sternocleidomastoid muscle begins from the sternum and clavicle. It is attached to the mastoid process and linea nuchae superior. It has foramen on its posterior side. The sternocleidomastoid artery and branch of the accessory nerve penetrate through this hole. The compression of this nerve causes contracture of the sternocleidomastoid muscle, torticollis and paresis of the trapezius muscle.

The sternocleidomastoid muscle is supplied by the sternocleidomastoid artery. The accessory nerve and cervical plexus innervate this muscle.

The third neck fascia, m. omohyoideus and retrosternocleidomastoid cul-de-sac are located at the inferior third part of the sternocleidomastoid muscle. Posterior fascial sheath of the sternocleidomastoid muscle is anterior wall of the carotid sheath. The carotid sheath is surrounded by parietal sheath of the fourth fascia of the neck. There are common carotid artery (medially and deeper), internal jugular vein (laterally and superficially) and vagus nerve (between them).

The common carotid artery arises from the brachiocephalic trunk on the right and from the aortic arch on the left. It goes out through the upper aperture of the chest. The common carotid artery enters the spatium antescalenum. Then it goes up. The common carotid artery is located at the side of the trachea, larynx and esophagus. It is projected on the line drawn from the sternoclavicular joint to the middle of distance between the angle of the mandible and the mastoid process. Radix superior n. hypoglossus, cardiac

branches of the vagus nerve and sympathetic trunk are located on the the parietal wall of the common carotid artery. Cyon nerve goes down along the inner wall of the artery.

The common carotid artery is divided into 3 parts:

- from the sternoclavicular joint to the inferior belly of m. omohyoideus;
- from the inferior belly of m. omohyoideus to the bifurcation;
- the bifurcation of the common carotid artery.

The common carotid artery comes from the superior part of the anterior border of the sternocleidomastoid muscle in the carotid triangle. And the accessory nerve crosses the outer surface of the internal jugular vein.

The common carotid artery is covered by the sternocleidomastoid muscle and the omohyoid muscle in the middle third of it.

Radix inferior plexus cervicalis goes around the outer surface of the internal jugular vein. It connects with radix superior n. hypoglossus and forms ansa cervicalis. Ansa cervicalis is located anteriorly to the internal jugular vein and common carotid artery. It innervates m. omohyoideus, m. sternohyoideus, sternothyreoideus and m. thyreohyoideus.

The common carotid artery is located between the sternum and the clavicular part of m. sternocleidomastoideus. It is covered with the m. sternohyoideus, m. sternothyreoideus, and v. jugularis interna lies in front of the artery.

Plexus cervicalis is located behind the neurovascular bundle and under the fifth fascia of the neck. It is formed of branches of CI–CIV cervical segments. The long branches begin from plexus cervicalis and innervate the skin, muscles of the neck and diaphragm.

The great auricular nerve innervates the skin of the ear and the external auditory canal.

The lesser occipital nerve – the occipital areas of the skin.

The transverse cervical nerve – the skin anterior region of the neck.

The supraclavicular nerves – the skin of the deltoid and the subclavian areas.

The phrenic nerve – pleura, pericardium, peritoneum, diaphragm, liver and gallbladder.

The sympathetic trunk lies under the fifth fascia of the neck and behind the neurovascular bundle.

Cervical sympathetic trunk consists of four components: superior, middle, and inferior or stellate ganglions by I. A. Ageienko.

I. *The superior cervical ganglion* is located at m. longus capitis at the level

of the transverse processes of II–IV cervical vertebrae behind the internal carotid artery, medially from the vagus nerve. Its length is from 2 to 4 cm.

Postganglionic fibers arise from the superior cervical ganglion. They are as follows:

1) *gray ramus communicans* goes to three cervical spinal nerves;

2) *internal carotid nerve* goes to the artery of the same name. It forms pl. caroticus internus.

From the plexus branch out:

1. The superior caroticotympanic nerve − to the mucous membrane of the middle ear.

2. The deep petrosal nerve passes through the foramen lacerum in the pterygoid canal. The deep petrosal nerve and n. canalis pterygoidei go to the pterygopalatine fossa and pterygopalatine node. Sympathetic fibers become the part of n. maxillaris after going through the node. They reach the smooth muscle and glands of the mucous membrane of the mouth, nose, conjunctiva, lower eyelid and skin of the face.

Periarterial trunks with a. ophthalmica enter the orbit through the canalis opticus and reach the ciliary ganglion. They together with nn. ciliares breves go to the eyeball and innervate vessels and m. dilatator pupillae.

3. The external carotid nerves (*nn*. *carotici externi*) form a plexus (plexus caroticus externus) around the external carotid artery. Plexus innervates vascular smooth muscle, glands and organs of the head.

4. The jugular nerve accompanies the internal jugular vein and gives rami communicantes to the IX, X, XII pairs of cranial nerves.

5. The rami communicantes go to the pharynx and larynx.

6. The superior cardiac nerve descends along the anterior wall of the common carotid artery. It takes part in forming the plexus cardiacus.

II. *The middle cervical ganglion* is located on the longus colli muscle at the level of the VI cervical vertebra above the arc of the inferior thyroid artery. The superior cervical cardiac nerve arises from the middle cervical ganglion.

III. *The vertebral ganglion* is inconstant. It is located on the front surface of the vertebral artery, at the level of the VII cervical vertebra. R. interganglionaris arises from this ganglion to the inferior one and forms ansa subclavia.

IV. *The inferior cervical ganglion* merges with the first thoracic ganglion and forms ganglion stellatum. Ganglion stellatum is located in the scaleno-vertebral triangle (trigonum *scalenovertebrale*) at the level of the head of the I rib behind the vertebral and subclavian arteries.

The thyrocervical trunk is located anteriorly and laterally from the

ganglion. And the thoracic duct is located anteriorly and medially on the left.

Some branches arise from the inferior cervical ganglion. They are:

1) the branch to the ansa subclavia;

2) the branch to the subclavian artery (forms plexus subclavius). The branches of this plexus reach the thyroid, parathyroid glands and organs of mediastinum;

3) communicans branches to the vagus and phrenic nerve;

4) the vertebral nerve forms plexus vertebralis surrounding the vertebral artery. Plexus vertebralis innervates vessels of the brain and spinal cord and their meninges;

Barre–Lieou syndrome occurs at cervical osteochondrosis due to compression of the vertebral artery and cervical sympathetic plexus. The symptoms are headache, eye pain recurrent disturbed vision, ear pain, tinnitus, vertigo, facial vasomotor disturbance, neck pain at moving, memory impairment and anxiety.

5) the inferior cardiac nerve joins the deep part of the cardiac plexus.

Petit's syndrome occurs at injuries that suppose stimulation of the sympathetic fibers at the level of the proximal portion of the first dorsal root or in the cervical sympathetic chain. Petit's syndrome is characterized by the unilateral appearance of mydriasis, lid retraction and exophthalmos.

The cervical part of sympathetic trunk innervates the smooth muscles of the eyeball, eyelids (mm. tarsales) and orbit (mm. orbitales).

Horner's syndrome (also known as Bernard-Horner's syndrome (Horner – Swiss ophthalmologist)) is a combination of symptoms that occur when a group of nerves known as sympathetic trunk is damaged. The signs and symptoms occur on the same side as the injury of the sympathetic trunk. It is characterized by miosis (constricted pupil), ptosis (weak, drooping eyelids), apparent anhidrosis (decreased sweating) with or without enophthalmus (eyeball retraction).

The vessels of the head and face expand at the same time.

The vago-sympathetic blockade by Vyshnevskyi

Indications: prevention of pleuropulmonary shock in case of thoracic trauma, severe wounds of the chest wall, transpleural operations on the esophagus and lungs.

The infused solution of Novocaine is injected into the tissue that surrounds the upper cervical node and the vagus nerve which lies nearby. Pain impulses coming from the chest cavity are blocked. Correctly performed manipulation

results in Horner's syndrome.

Spatium antescalenum *is located in the lower part of sternocleidomastoid area.*

The boundaries of the *spatium antescalenum* are:

1) anterior and lateral − m. sternocleidomastoideus and m. omohyoideus;

2) anterior and middle − m. sternohyoideus and m. sternothyreoideus;

3) posterior − m. scalenus anterior.

Spatium antescalenum consists of:

• bulbs of the internal jugular vein;

• the subclavian vein.

They merge and form the venous angle of Pirogov into which empty:

• the external jugular vein;

• the left thoracic duct;

• the right lymphatic duct.

Medially from the internal jugular vein are located:

• the vagus nerve;

• the common carotid arteries.

Behind the vein under the fifth fascia along the anterior surface of m. scalenus anterior passes the phrenic nerve.

It is projected on the skin of the small supraclavicular fossa. The fossa is located between the sternocleidomastoid muscle pedicles. It causes pain at inflammation of the gallbladder. Pain during pressing between pedicles of the right sternocleidomastoid muscle is phrenicus symptom.

The ascending cervical artery passes near and medially to the phrenic nerve.

The suprascapular artery and superficial cervical artery are located anteriorly to the phrenic nerve.

Trigonum scalenovertebrale is located in the sternocleidomastoid area, medially and deeper than antescalen space.

The boundaries of the *trigonum scalenovertebrale* are:

• laterally − m. scalenus anterior;

• medially − m. longus colli and vertebral bodies;

• inferiorly − the dome of the pleura;

• anteriorly − fifth fascia of the neck.

The top of the triangle − tuberculum caroticum, anterior tubercle of the transverse process of the VI cervical vertebrae.

The triangle consists of:

• the first part of the subclavian artery;

• middle and inferior or stellate ganglions;

• the vertebral vein;

• the thoracic lymphatic duct on the left.

The subclavian artery is divided into three parts.

The first part is located in the trigonum scalenovertebrale from the beginning of the scalenus anterior muscle to its inner border.

The second part of the subclavian artery is located in the interscalene space.

The third part is located in the lateral triangle of the neck.

The right subclavian artery arises from truncus brachiocephalicus, goes up, bends round the dome of the pleura and enters the interscalene space. The medial surface of the right subclavian artery adjoins the trachea and common carotid artery.

The vertebral vein and the internal jugular vein empty into the venous angle. They are covered with m. sternocleidomastoideus, m. sternohyoideus and m. sternothyreoideus.

The phrenic nerve and the vagus nerve are located between vein and artery and cross the artery.

The vagus nerve is located medially to truncus thyreocervicalis and the phrenic nerve – laterally to it. Ansa subclavia is located at the base of truncus thyreocervicalis. The recurrent laryngeal nerve and ganglion stellatum are located behind the subclavian artery.

The branches of the subclavian artery in the trigonum scalenovertebrale are as follows:

1. The vertebral artery passes to the foramen transversarium of the VI cervical vertebrae;

○ the vertebral vein and ganglion cervicale intermedius (g. vertebrale) are located behind and medially to the vertebral artery;

2. The thyrocervical trunk is located at the medial border of m. scalenus anterior and divided into:

• the inferior thyroid artery passes to the posterior surface of lateral area of the thyroid gland behind the common carotid artery and in front of vertebral artery. Its branches pass to the the pharynx, esophagus, trachea and larynx (a. laryngea inferior);

• the ascending cervical artery goes up along the anterior scalene muscle, medially to the phrenic nerve, supplies neck muscles with blood;

• the superficial cervical artery is located on the anterior surface of the scalene muscles;

• the suprascapular artery passes along the clavicle to incisura scapulae.

3. The internal thoracic artery arises from the lower semicircle of the subclavian artery and goes down along the inner surface of the anterior chest wall.

• Cervical part of the thoracic duct is located in the trigonum scalenovertebrale. Ductus thoracicus begins in the neck near the left border of esophagus at apertura thoracis superior. It is located behind the subclavian artery. It goes up, passes in front of vertebral vein and artery behind the common carotid artery, internal jugular vein and vagus nerve.

The thoracic duct adjoins the dome of the pleura, crosses the subclavian artery in front (near the place of truncus thyreocervicalis departing) and empties into the internal jugular vein or Pirogov's venous angle.

The left jugular and left subclavian trunks empty into the arc of the lymphatic ducts.

The drainage of the lymphatic duct is used to unload the organism from metabolic products and toxins at acute poisoning, intoxication, peritonitis, cirrhosis.

THE LATERAL TRIANGLE OF THE NECK

Borders

Anteriorly: the posterior border of sternocleidomastoid muscle;

Posteriorly: anterior border of the trapezius muscle;

Inferiorly: clavicle.

The omohyoid muscle divides the posterior triangle of the neck into two triangles:

• the *occipital triangle (trigonum omotrapezoideum);*

• the *subclavian triangle or supraclavicular triangle (trigonum omoclaviculare).*

Skin is thin, mobile. The small blood vessels, nerves and platysma are located in the subcutaneous tissue.

Between the first and the second fascia are:

• v. jugularis externa;

• nodi lymphatici cervicalis superficialis;

• branches of the cervical plexus:

○ n. auricularis magnus;

○ n. transversus colli;

○ n. occipitalis minor;

○ nn. supraclaviculares anteriores, medii et posterior.

Between the second and the fifth fascia in the occipital triangle are:

• the superficial cervical artery;

• the superficial cervical vein;

• the lymph nodes;
• the small segment of external jugular vein;
• the branches of the cervical plexus;
• the accessory nerve (under m. trapezius).

The accessory nerve is projected on the skin along the line from the point between the upper and middle third of the posterior border of the sternocleidomastoid muscle to the point between the middle and lower third of the anterior border of the trapezius muscle.

Between the third and the fifth fascia in the subclavian triangle are:
• the suprascapular artery;
• the suprascapular vein;
• the superficial cervical artery;
• the lymph nodes.

Under the fifth fascia in the occipital triangle are:
• the adipose tissue;
• the anterior, middle and posterior scalene muscle;
• the levator scapulae muscle;
• the splenius capitis and cervicis muscles.

Under the fifth fascia in the subclavian triangle are:
• the adipose tissue;
• the subclavian artery;
• the subclavian vein;
• the brachial plexus.

There are two cellular spaces in the lateral triangle. The superficial space is located between the second and the third fasciae of the neck. The deep space is located between the third and the fifth fasciae of the neck. These cellular spaces are joined with cellular tissue of the subclavian area, armpits and cellular tissue of the superior mediastinum.

The subclavian vein arises from the axillary vein. The border between them is outer margin of the first rib. It lies on the upper surface of the first rib. And it is located in antescalen space. It forms v. brachiocephalica with the internal jugular vein on the posterior surface of the sternoclavicular joint.

The subclavian vein goes up in the oblique direction. It does not move at movement of the upper limbs because it is closely linked to the surrounding tissues. The subclavian vein is closely connected with the clavicular periosteum and the first rib. Its lumen remains unchangeable even with the decrease of blood volume when all other peripheral veins coalesce. The injury

of the subclavian vein causes embolism (complication of fractures of the clavicle). The subclavian vein is divided into two parts. The first part is located in the clavipectoral triangle. The second part is located in antescalen space behind the clavicle on the first rib.

The subclavian vein lies behind the clavicle, in front of the anterior scalene muscle. The anterior scalene muscle separates the subclavian artery from the subclavian vein. Then subclavian vein passes over the dome of the pleura and covers the subclavian artery.

The cephalic vein, the suprascapular vein, the transverse cervical vein, the external jugular vein, the deep cervical vein, the vertebral vein, thoracic or jugular lymphatic ducts empty into the subclavian vein.

The puncture and catheterization of the subclavian vein by Seldinger is used for prolonged infusion therapy when large superficial veins coalesce. Puncture of the subclavian vein may be made through the sub- and supraclavicular access.

At subclavicular access the most convenient is catheterization or puncture by Abaniak's method.

Puncture point: 1 cm below the middle and inner third of the clavicle, the angle is formed by the upper border of the clavicle and lateral pedicle of the sternocleidomastoid muscle. The needle must be inserted into the skin a little above the apex angle, into Yoffe's point.

The subclavicular vein catheterization is more reasonable and safe because large veins, thoracic or jugular lymphatic ducts empty into the upper wall of the subclavian vein; the subclavian vein is located near the dome of the pleura above the clavicle. The injury of pleura causes pneumothorax. It is separated from the dome of the pleura by the first rib below the clavicle.

Morphologic and anatomic characteristics may be used to explain frequent subclavicular vein catheterization.

1. The subclavian vein has permanent location and clear upperographical landmarks.

2. It has large lumen (12–25 mm in adults).

3. Its lumen remains unchangeable even with the decrease of blood volume.

4. The high rate of blood flow in the vein prevents thrombosis.

Compression of the subclavian vein in the interspace between the clavicle and the first rib (costo-clavicular interspace) causes valve hypertrophy of the subclavian vein and thrombosis – *Paget-Schroetter disease*. Symptoms may

include sudden onset of pain, warmth, redness, blueness and swelling in the arm.

The subclavian artery and the brachial plexus penetrate into the posterior triangle of the neck through *spatium interscalenum.*

The anterior and middle scalene muscle are attached to the first rib (anterior scalene muscle to the tubercle of scalene muscle tuberculum m.scaleni and the middle – behind and a little bit outside from the anterior muscle).

The subclavian artery is located anteriorly, below and medially from the brachial plexus. It is surrounded by loose tissue which contains lymph nodes.

The middle compartment of the subclavian artery is located in the interscalen space. *Truncus costocervicalis* arises from it.

The deep cervical artery goes to the posterior portion of the neck. It passes between the transverse processes of the VII cervical vertebra and the first rib. It anastomoses with the occipital and vertebral arteries.

The intercostal artery passes posteriorly and down in front of the necks of the I and II ribs. The first and the second intercostal arteries arise from it.

Thoracic outlet syndrome (TOS) is a syndrome which occurs at compression of neurovascular bundle located in the interscalene space. Thoracic outlet syndrome symptoms include neck pain, shoulder pain, arm pain, numbness and tingling of fingers, impaired circulation in the extremities (causing discoloration). Numbness and tingling occur on the ulnar edge of the arm.

There are many causes of TOS including injury, cervical rib (extra rib extending from the neck present at birth), tumors that press on nerves, osteochondrosis.

The following may increase the risk of thoracic outlet syndrome development: hypertrophy of the anterior scalene and middle scalene muscles in athletes, manual labour and constant wearing a rucksack.

Subclavian steal syndrome (SSS), also called subclavian steal steno-occlusive disease is a set of signs and symptoms that arise from reversed vertebral artery blood flow due to occlusion of the subclavian artery. The arm may be supplied by blood flow in the retrograde direction down the vertebral artery at the expense of the vertebrobasilar circulation. It is called the *subclavian steal*.

Cerebral Steal Syndrome, also called Reversed Robin Hood Syndrome arises from anastomosis between the vertebral artery, occipital artery, thyrocervical trunk and costocervical trunk due to occlusion of the second compartment of the subclavian artery.

Transaxillary first rib resectiont with resection of the anterior and middle

scalene muscles are used for thoracic outlet syndrome treatment.

The third compartment of the subclavian artery lies outside of interscalene space, outwards from the anterior scalene muscle in the posterior triangle of the neck. The subclavian artery passes round the first rib and enters the armpit area. The transverse cervical artery arises from the third compartment of the subclavian artery. It passes through the brachial plexus to the back and neck muscles.

The brachial plexus (plexus brachialis) is a somatic nervous plexus formed by interaction between the ventral rami (roots) of the four inferior cervical nerves (C5-C8) and the first thoracic nerve (T1).

These roots form three trunks:

- "superior" or "upper" (C5-C6)
- "middle" (C7)
- "inferior" or "lower" (C8, T1)

Three trunks form the supraclavicular part of brachial plexus.

Then each trunk splits into two branches and forms six divisions:

- anterior divisions of the upper, middle, and lower trunks;
- posterior divisions of the upper, middle, and lower trunks.

These six divisions are split into three cords. The cords are named by their position with regard to the axillary artery:

- the *posterior cord* is formed from the three posterior divisions of the trunks (C5-C8,T1);
- the *lateral cord* is formed from the anterior divisions of the upper and middle trunks (C5-C7);
- the *middle cord* is simply a continuation of the anterior division of the lower trunk (C8, T1).

The posterior cord continues in the radial nerve. The median nerve originates from the medial branches of the lateral (from C5 to C7 roots) and middle cords (C8 and T1). The musculocutaneous nerve arises from the lateral branches of the lateral cord. The ulnar, the medial brachial cutaneous nerve and the lateral antebrachial cutaneous nerve originate from the lateral branches of the medial cord.

The cords enter the large supraclavicular fossa from interscalene space. The cords and their branches are located behind, above and at the side of the subclavian artery. The branches form supraclavicular part of brachial plexus.

They are the following:

- dorsal scapular nerve which passes on the anterior surface of the levator scapulae muscle, between it and posterior scalene muscle. It is accompanied by deep branch of the transverse cervical artery. Dorsal scapular nerve

innervates the rhomboid major muscle and the levator scapulae muscle;

• long thoracic nerve descends along the middle scalene muscle and on outer surface of the serratus anterior muscle and innervates it;

• the *medial and lateral pectoral* nerves descend behind the clavicle and in front of the subcalvian artery and vein to the *pectoralis major* and minor muscles and innervate them;

• the subclavian nerve goes along the outer margin of the anterior scalene muscle, in front of the subclavian artery. It innervates the subclavian muscle.

• the suprascapular nerve goes to the inferior belly of the omohyoid muscle. It is accompanied by the suprascapular artery. They enter the supraspinatous fossa and then the infraspinatous one. The suprascapular nerve innervates the supraspinatous and the infraspinatous nerves.

• the subscapular nerve passes on the anterior surface of the muscle of the same name. It innervates the subscapular muscle and the teres major muscle.

• the thoracodorsal nerve passes along the lateral border of the scapula to the latissimus dorsi muscle and innervates it.

ORGANS OF THE NECK

THYROID GLAND (GLANDULA THYREOIDEA)

It consists of two lobes (right and left) and the isthmus. The pyramidal lobe is present in 1/3 of cases. The thyroid gland has connective tissue capsule continuous with the septa that make up the stroma of the organ. Externally to the true capsule is more or less welldeveloped layer of fascia derived from the pretracheal (visceral) fascia. The arteries, nerves and the parathyroid gland are located between the capsule and fascia in adipose tissue. Visceral fascia forms ligaments that fixate the gland to the trachea, thyroid and cricoid cartilage.

Median thyrohyoid ligament goes from the isthmus to the cricoid cartilage. The surgeons dissect it at the upper tracheotomy to put down the isthmus and to expose the upper rings of the trachea. The sternohyoid muscle, the sternothyreoid muscle and the omohyoid muscle cover the gland anteriorly. 2–4 cartilages of the trachea are contained behind the isthmus. The lobes cover the trachea, pharynx, larynx and esophagus. The parathyroid gland and the inferior thyroid artery are located behind the thyroid gland. The recurrent laryngeal nerve is located posteriorly and middlely to the gland.

The common carotid artery is located posteriorly and laterally to the gland.

Upper poles of lateral lobes reach the middle of the thyroid cartilage. Lower pole is at the level of 5–6 rings of trachea. The superior thyroid artery arises from the external carotid artery and gets the upper poles of the right and left lobes. It supplies anterior part of the gland. The inferior thyroid artery arises from the thyrocervical trunk and gets the inferior poles of the right and left lobes. It crosses the recurrent laryngeal nerve at the posterior surface of the gland. The thyroidea ima artery arises from the brachiocephalic trunk and ascends in front of the trachea to the isthmus.

Glandular venous outflow flows by the superior and middle thyroid veins into the internal jugular vein and by the inferior thyroid veins into the brachiocephalic vein.

Lymph vessels of the thyroid gland empty into the deep cervical and paratracheal lymph nodes. It is important to know relation of the recurrent laryngeal nerve with the superior parathyroid gland during consecutive thyroidectomies.

The close relation of these anatomical structures with the thyroid gland poses the potential threat of injury at surgical intervention and the development of serious complications in future.

The superior laryngeal nerve is a branch of the vagus nerve. It is divided into two branches at the level of the large horn of the hyoid bone: external laryngeal nerve and internal laryngeal nerve.

The external laryngeal nerve descends on the larynx, beneath the sternothyroid muscle to supply the cricothyroid muscle. The internal laryngeal nerve descends to the thyrohyoid membrane piercing it together with the superior laryngeal artery and is distributed to the mucous membrane of the larynx. The recurrent laryngeal nerves bend round aorta from below and behind (on the left) and the subclavian artery (on the right), ascend in the furrow between the trachea and esophagus. The tracheal, esophageal and thyroid branches and the inferior laryngeal nerve arise from the recurrent laryngeal nerves. The recurrent laryngeal nerve passes in the thickness of thyroid-tracheal ligament (in 50 % cases). It causes injury due to stretching ligament at surgical operation. The recurrent laryngeal nerve is located between visceral layer of the fourth fascia and connective tissue capsule. It passes on the posterior surface of the thyroid gland. It intersects with the inferior thyroid artery. The recurrent laryngeal nerve is located anteriorly or posteriorly

to it or between its branches. Aphonia is the inability to produce voice. It is caused when the nerve is injured on the one side of the gland.

When the nerve is injured on both sides, it causes paresis (weakness) or paralysis (complete lack of movement) in the vocal fold with the development of asphyxia. (It is a condition of severely deficient supply of oxygen to the body that arises from abnormal breathing. Tracheotomy is an effective measure in controlling asphyxia).

The sympathetic branches arise from the cervical sympathetic nodes. They form plexus with the branches of the vagus nerve. The branches of the vagus nerve are composed of external laryngeal nerve and the recurrent laryngeal nerve. The thyroid hormones are triiodothyronine (T_3) and its prohormone, thyroxine (T_4) and calcitonin. Iodine is necessary for the production of T_3 and T_4. It enters the body through food, water and air in the form of organic and inorganic compounds. Too little production of thyroxine by the thyroid gland and iodine deficiency cause hypertrophy and hyperplasia of the thyroid epithelium. As a result, the enlargement of the thyroid gland occurs. It is called goitre. Goitre is associated with hypothyroidism. Regarding morphology, goitres may be classified either as the growth pattern or as the size of the growth:

Growth pattern:

• nodular (struma uninodosa): can be either inactive or a toxic nodule;

• multinodular (struma multinodosa): can likewise be inactive or toxic, the latter called toxic multinodular goitre;

• diffuse (struma diffuse): the whole thyroid appears to be enlarged.

Graves' disease, also known as toxic diffuse goiter and Flajani-Basedow-Graves disease, is an autoimmune disease that affects the thyroid gland. It frequently results in hyperthyroidism and enlarged thyroid. Signs of hyperthyroidism may include goiter, exophthalmos and tachycardia.

Other signs of hyperthyroidism are:

• *von Graefe's sign* (lid lag sign) is the immobility or lagging of the upper eyelid at downward rotation of the eye;

• *Möbius sign* is a clinical sign at which inability to maintain convergence of the eyes occurs;

• *Stellwag's sign* is a sign of infrequent or incomplete blinking;

• *Dalrymple's sign* is a widened palpebral (eyelid) opening, or eyelid spasm.

The nodular or multinodular goiter, diffuse goiter, acute infectious thyroiditis and thyroid cancer are indications for operation.

Parathyroid glands (gl. parathyreoideae)

The parathyroid glands are four tiny glands usually found on the posterior surface of the thyroid gland between thyroid capsule and visceral layer of the fourth fascia of the neck. The superior parathyroid glands are located at the level of cricoid cartilage, at the middle of distance between the upper pole and isthmus of the thyroid gland.

The inferior parathyroid glands are located at the lower pole of the thyroid gland in the place of entry of the inferior thyroid artery. Parathyroid glands have the shape of the oval small bodies, about 7 mm of reddish-brown or yellow colour.

The inferior thyroid artery supplies the parathyroid glands. Venous outflow is carried out into the veins of the thyroid gland. Parathyroid glands receive the sympathetic innervation from the cervical sympathetic nodes. Parasympathetic fibers arise from the vagus nerve. Parathyroid glands are the endocrine glands. These glands produce parathyroid hormone. It controls calcium and phosphate levels in the body.

Hypoparathyroidism develops after injury of the parathyroid gland during the operations on the thyroid gland. Its symptoms are cramps, nervous and mental disorders, and lowering calcium in blood. The cramps capture the muscles of the face and upper extremities. They can spread to the muscles of pharynx and larynx and cause asphyxia. The stimulating of the peripheral nerves or muscles with high sensibility causes the cramps (symptoms – *Chvostek's sign:* when the facial nerve is tapped at the angle of the jaw (i. e. masseter muscle), the facial muscles on the same side of the face will contract momentarily because of hypocalcemia; *Trousseau's sign* – a sign of tetany at which carpal spasm can be elicited by compressing the upper arm and causing ischemia to the nerves distally).

10 ml of 10 % solution of calcium chloride are injected to remove tetany attack. Further Parathyreoidinum is injected with calcium chloride to retain level of calcium.

THE LARYNX

The larynx commonly called the voice box, is an organ in the neck involved in breathing, sound production, and protecting the trachea from food aspiration.

There are 6 cartilages, three unpaired and three paired that support the larynx and form its skeleton.

Unpaired cartilages:

• thyroid cartilage forms the Adam's apple;
• cricoid cartilage;
• epiglottis.

Paired cartilages:
• arytenoid cartilages;
• corniculate cartilages;
• cuneiform cartilages.

The cartilages are connected by ligaments. The cricothyroid and cricoarythenoid articulations provide the mobility of cartilages.

The constrictor muscles of the glottis:
• the lateral cricoarytenoid muscles;
• the thyroarytenoid muscle;
• the arytenoid muscle;
• the oblique arytenoid muscle;
• the aryepiglottic muscle.

The dilator muscles of the glottis:
• the posterior cricoarytenoid muscle;
• the thyreoepiglotticus muscle.

The muscles changing of the glottis tension:
• the vocalis muscle;
• the cricothyroid muscle.

The cavity of the larynx looks like an hourglass. The boundaries of the laryngeal inlet are:
- anterior – epiglottis;
- lateral – aryepiglottic fold (*plicae aryepiglottica*);
- posterior – apex of arytenoid cartilages.

The portion of the cavity of the larynx above the vocal folds is called the vestibule. The ventricle of the larynx (also called the laryngeal sinus, laryngeal ventricle or Morgagni's sinus) is a fusiform fossa located between the ventricular and vocal folds on both sides and extending nearly their entire length. The vocal folds are located within the larynx at the upper part of the trachea. They are attached posteriorly to the arytenoid cartilages and anteriorly to the thyroid cartilage. The rima glottidis is the opening between the true vocal cords and the arytenoid cartilages. It is conditionally subdivided into two parts: the part between the arytenoid cartilages is called the intercartilaginous part (or the intercartilaginous glottis, respiratory glottis, or interarytenoid space) and the part between the vocal folds is called

the intermembranous part or glottis vocalis. The part of the laryngeal cavity of the larynx immediately below the glottis is called infraglottic cavity.

The larynx is located at the level from the IV to the VI cervical vertebrae. In children it is located more superiorly in the neck (the superior border reaches the III vertebra). The larynx in elderly people is located more inferiorly in the neck (the superior border reaches the VI vertebra).

Location of the larynx changes depending on the position of the head and the functional state of adjacent organs. It can move up, down and sideways. The sternohyoid muscle, sternothyreoid muscle and thyrohyoid muscle cover larynx in front.

Posteriorly to the larynx is located pharynx.

Laterally − two lobes of the thyroid gland and common carotid artery.

Superiorly – larynx opens into the cavity of the pharynx. There is hyoid bone. It is connected with the larynx through the thyrohyoid membrane.

Inferiorly − enters the trachea.

The superior laryngeal artery and the inferior laryngeal artery supply the larynx.

This artery branches from the superior thyroid artery near its bifurcation from the external carotid artery. It pierces the hyothyroid membrane and supplies the muscles, mucous membrane and glands of the larynx anastomosing with the branch from the opposite side.

The inferior laryngeal artery arises from the thyrocervical trunk and supplies the posterior part of the larynx. The superior laryngeal artery empties into the superior thyroid artery. The inferior laryngeal artery empties into the inferior thyroid artery.

Lymphatic vessels of the upper part of the larynx pass to the deep cervical lymph nodes. The deep cervical lymph nodes are located along neurovascular bundle of the neck. Lymphatic vessels of the inferior part of the larynx pass to the paratracheal and paralaryngeal lymph nodes.

Innervation of the larynx is carried out by the branches of the vagus and sympathetic nerves. Vagus nerve gives off the superior and inferior laryngeal nerves. The superior laryngeal nerve contains motor fibers for the cricothyroid muscle. It innervates the mucous membrane of the larynx above the glottis. The inferior laryngeal nerve or the recurrent laryngeal nerve innervates the mucous membrane of the larynx below the glottis and contains motor fibers for the other muscles of the larynx. The sympathetic fibers pass to the upper part of the larynx from the stellate ganglion of the sympathetic trunk. They pass as a part of the superior and inferior laryngeal nerves.

THE TRACHEA

The trachea (or windpipe) is a hollow tube that connects the larynx (or voice box) to the bronchi of the lungs. It is lower and inseparable part of the airway of the body. It looks like a cylindrical tube in length of 11−13 cm.

The trachea consists of tracheal cartilages that look like semirings (*cartilagins tracheales*). Circular bands of fibrous connective tissue called the annular ligaments of trachea join the tracheal rings together.

The membranous wall of trachea (paries membranaceus) is the part of the tracheal wall which is not reinforced by tracheal cartilages. The membranous wall of trachea is formed by connective tissue and smooth muscle.

The trachea is covered with mucous membrane. The mucosa is the inner layer which consists of ciliated pseudostratified columnar epithelium with many goblet cells. Tracheal mucous glands are located in the submucosal layer. Their excretory ducts open to the surface of epithelium. Tracheal mucosa has a large absorbing effect.

There are two parts of the trachea – cervical and thoracic. They are separeted by the margin of the jugular notch. The cervical part consists of 6−8 semirings. It is more movable during breathing, swallowing, talking and coughing. The trachea is located at 1–2 cm from the skin (to 3–4 cm at the level of jugular notch).

The cervical part of trachea is located from the lower margin of the VI cervical vertebrae (in children – at the IV–V) to the second thoracic vertebra. Cervical part of trachea is located in the infrahyoid area. The sternohyoid and sternothyreoid muscles are located in front of the trachea. They are connected with the third fascia of the neck. The sheaths of the third fascia anastomose with the second fascia at the midline. It is of 2–3 mm in width and does not reach the sternal notch at 3 cm. The thyroid gland adjoins the anterior tracheal wall.

There are the following structures anteriorly in the inferior half of the cervical part of trachea:

- pretracheal fascia;
- the thyroid ima artery;
- the inferior thyroid veins and unpaired thyroid venous plexus;
- the upper pole of the thymus in children;
- lymph vessels and nodes;
- brachiocephalic veins passing medially;
- from behind – the esophagus;
- the recurrent laryngeal nerve – between the trachea and esophagus.

Laterally and to the right is located the right common carotid artery and

subclavian artery joining to form the right brachiocephalic trunk. Laterally and to the left is located the left common carotid artery. The thyroid gland lobes are located on both sides.

The trachea is supplied by the branches of the the inferior thyroid artery. Venous outflow is carried out in the thyroid veins. Lymph outflow – in the pretracheal lymph nodes. The tracheal branches of the recurrent laryngeal nerve and branches of the sympathetic trunk innervate the trachea.

Tracheotomy is a surgical procedure at which a cut or opening is made in the windpipe (trachea). The surgeon inserts a tube into the opening to bypass an obstruction and to allow air to get to the lungs or remove secretions. The term tracheostomy is sometimes used interchangeably with tracheotomy. Strictly speaking, tracheostomy is usually referred to the opening itself while a tracheotomy is the actual operation.

Indications for operation:

- laryngospasm;
- laryngeal edema;
- tumors;
- injuries;
- foreign bodies in the larynx and trachea;
- necessity of prolonged mechanical ventilation;
- necessity of sanitation of tracheobronchial tree during inflammatory diseases;
- traumatic brain injury;
- pulmonary edema.

THE PHARYNX

It is located from the skull base to the VI cervical vertebra. It consists of three structures: nasopharynx (pars nasalis), oropharynx (pars oralis), laryngopharynx (pars laryngea).

There are choanae on the anterior wall of the nasopharynx. On the lateral wall of the nasal part of the pharynx is located the pharyngeal opening of the auditory tube (pharyngeal ostium). The pharyngeal tonsil is located between the superior and posterior walls.

The pharyngeal tonsils are lymphoid tissue structures located in the posterior wall of the nasopharynx at the entrance to the throat. Waldeyer's tonsillar ring is an annular arrangement of lymphoid tissue. From superior and inferior the ring consists of:

- pharyngeal tonsil;

• 2 tubal tonsils;
• 2 palatine tonsils;
• lingual tonsil.

The oropharynx is located at the third cervical vertebra. It is a part of the digestive and respiratory systems.

The laryngopharynx is located at a distance from the entrance to the larynx to the entrance of the esophagus. There are piriform recesses on the lateral wall of the laryngopharynx. The fold of the superior laryngeal nerve is located at the bottom of the piriform recesses. The internal branch of the superior laryngeal nerve is located in the thickness of the fold of superior laryngeal nerve.

The connective tissue (fascia pharyngobasilaris) attaches the pharynx to the base of the skull and surrounding structures. Both circular (the superior, medium and posterior pharyngeal constrictors) and longitudinal muscles (the stylopharyngeus and the palatopharyngeus muscles) are located in the walls of the pharynx.

Muscles are covered by the buccopharyngeal fascia.

The boundaries of the pharynx:

- *laterally* − bounded by the parapharyngeal cellular tissue;
- *anteriorly* − nasal cavity, mouth and larynx;
- *posteriorly* − the body of 6 cervical vertebrae, the longus colli muscle covered by the prevertebral fascia, retropharyngeal space;
- *laterally in the inferior parts* − the common carotid arteries and upper poles of the thyroid gland;
- *superiorly* – parapharyngeal cellular tissue and its content (the internal carotid artery, the internal jugular vein, cranial nerves from IX–XII, truncus sympathicus and its superior cervical node, lymph nodes).

Blood supply of the pharynx:

1) the ascending pharyngeal artery (a. pharyngea ascendens) from the external carotid artery;
2) the ascending pharyngeal artery (a. palatina ascendens) from the facial artery;
3) the descending palatine artery (a. palatina descendens) from the maxillary artery;
4) the artery of the pterygoid canal (Vidian artery, canalis pterygoideus) from the maxillary artery;
5) the superior thyroid artery (a. thyreoidea superior) from the external

carotid artery;

6) the inferior thyroid artery (a. thyreoidea inferior) from the thyrocervical trunk.

The venous outflow is carried out into the pharyngeal plexus.

From the upper part of the pharynx – into the internal jugular vein.

From the lower part of the pharynx – into the vein of the thyroid gland.

The lymph outflow: into retropharyngeal and deep cervical lymph nodes.

Innervation: by plexus pharyngeus, branches of the IX and X pairs of cranial nerves and branches of the sympathetic trunks.

The retropharyngeal space is a potential space of the head and neck bounded anteriorly by the buccopharyngeal fascia and posteriorly by the prevertebral fascia. It contains the ascending pharyngeal artery, pharyngeal nervous plexus, pharyngeal venous plexus, retropharyngeal lymph nodes (The inflammation of retropharyngeal lymph nodes leads to the formation of retropharyngeal abscess).

The boundaries of the retropharyngeal space are:

- superiorly: base of the skull;
- inferiorly: at the level of the VI cervical vertebra, passes into the retrovisceral space;
- laterally: the pharyngoprevertebral aponeurosis;
- anteriorly: the buccopharyngeal fascia;
- posteriorly: the prevertebral fascia.

The retropharyngeal space is divided into two halves by median septum from the pharyngeal tubercle to the VI cervical vertebra. Therefore the abscesses are usually one-sided and located at the side from the midline.

THE CERVICAL ESOPHAGUS

The cervical esophagus is located in the infrahyoid area. The esophagus generally begins at the level from the VI cervical vertebra (C6) to the II thoracic vertebra (T2).

The trachea and cricoid cartilage lie anteriorly to the esophagus. The left inferior thyroid artery passes along the anterior wall of the esophagus in the transverse direction. The left recurrent laryngeal nerve is located in the left tracheoesophageal groove. The right recurrent laryngeal nerve lies on the lateral surface of the trachea. The lower poles of the lateral lobes of thyroid gland and the inferior thyroid arteries are in lateral relation to the esophagus on both sides.

The thoracic duct lies on the left side at the level of the VI cervical

vertebra. The right recurrent laryngeal nerve lies on the right side. Posteriorly it is related to prevertebral muscles and prevertebral fascia covering the bodies of the VI, VII and VIII cervical vertebrae. The retrovisceral space is located between the prevertebral fascia and the IV fascia of the neck. It continues into the retropharyngeal space upwards and in mediastinum downwards.

The pharyngeal narrowing is the narrowest place of the cervical esophagus. It is located in the place of transition from the pharynx into the esophagus. The cricoid cartilage presses the anterior wall of the esophagus in this place. The wall is thickened because of circular fibers of the inferior pharyngeal constrictor.

The supply of the cervical esophagus:

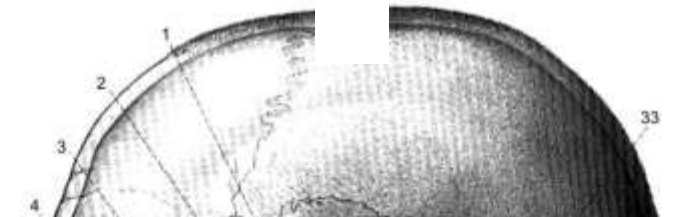
The inferior thyroid artery (a. thyreoidea inferior) from the thyrocervical trunk.

The venous outflow: into the inferior thyroid veins.

The lymph outflow: paratracheal and deep cervical lymph nodes.

Innervation: esophageal branches from the recurrent laryngeal nerves and the branches of the sympathetic trunk.

APPENDIX



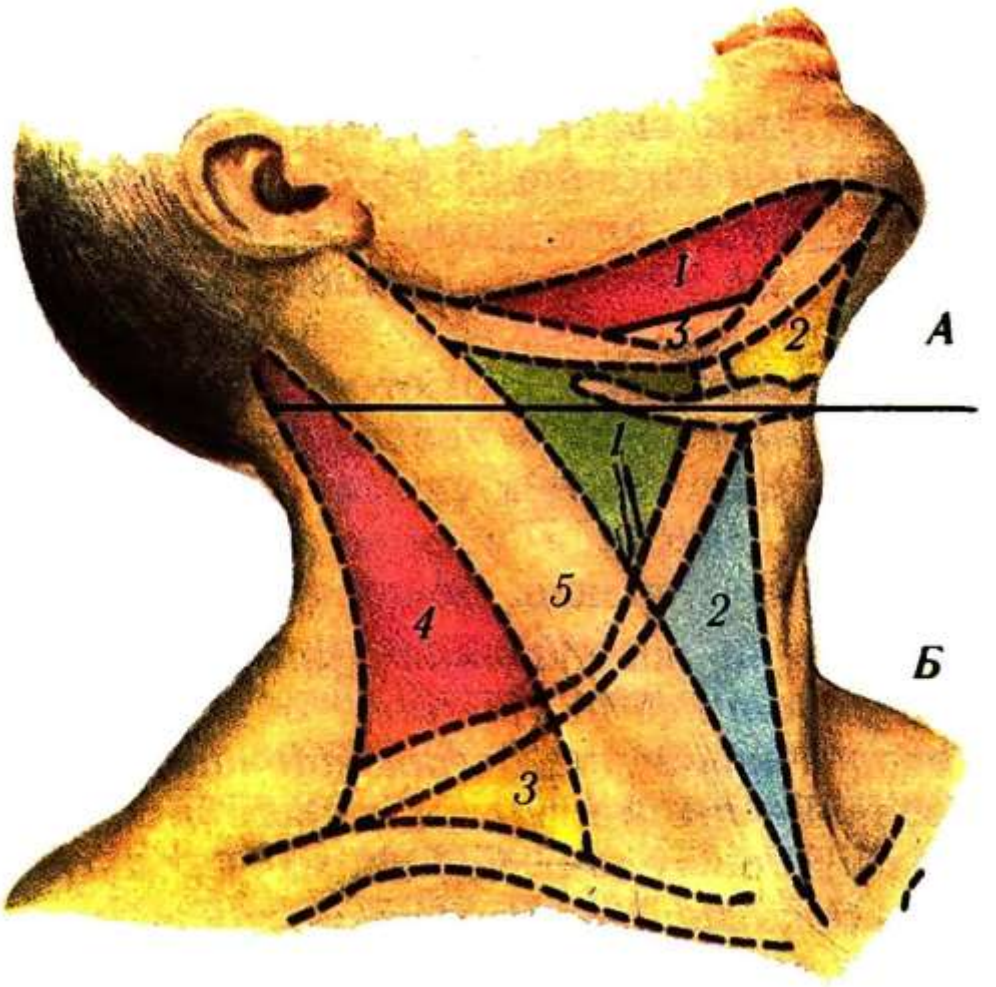
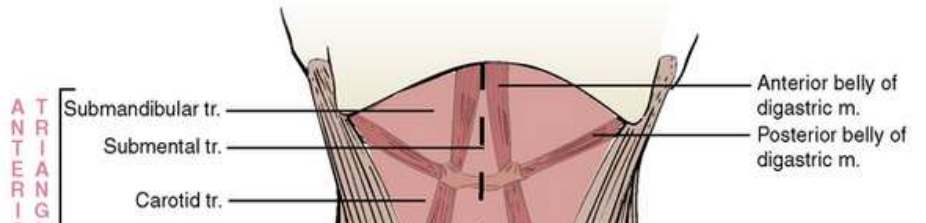


Figure 2 – Triangles in the division of the neck:
A – **regio suprahyoidea**: **1** – trigonum submandibulare; **2** – trigonum submentale; **3** – trigonum linguale. **B** – **regio infrahyoidea: 1** – trigonum caroticum; **2** – trigonum omotracheale; **3** – trigonum omoclavicularis; **4** – trigonum omotrapezoideum; **5** – regio sternocleidomastoidea

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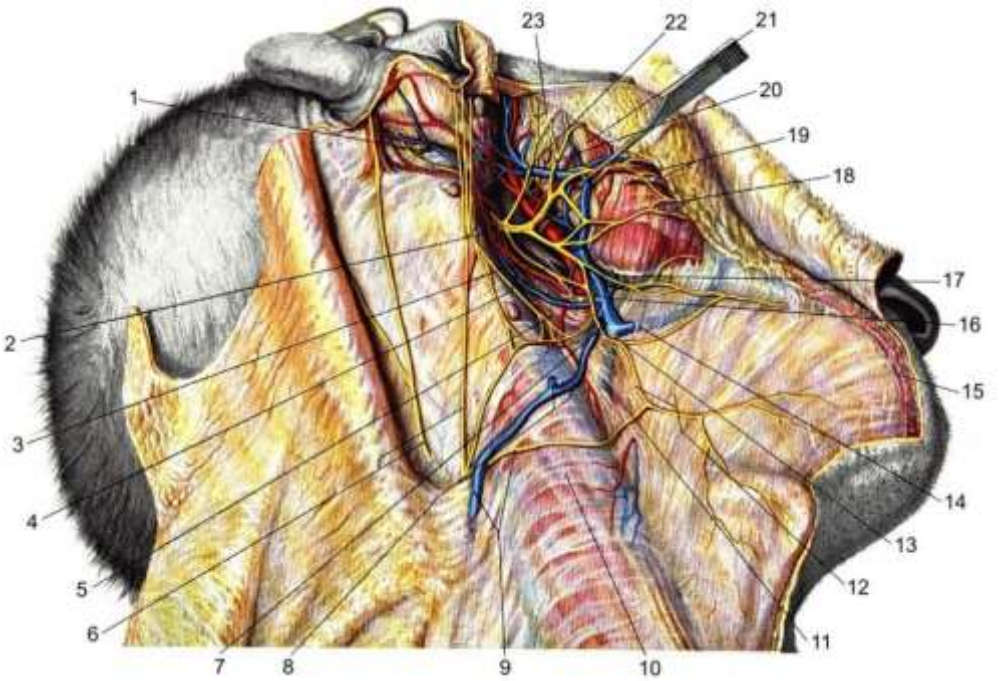


Figure 6 – Submandibular triangle. Superficial veins and nerves:
1 – a., v., n. auricul. post.; **2** – truncus n. facialis; **3** – r. colli n. fac.; **4** – r. digastr. (VII); **5** – m. digastricus (venter post.); **6** – n. auricul. magn.; **7** – r. colli n. fac., v. retromandib.; **8** – v. jugul. ext.; **9** – v. jugul. ext., n. transversus colli; **10** – fascia m. sternocleidomastoideus; **11** – v. facial. comm.; **12** – ansa cervic. superfic., fascia cervic.; **13** – v. facial. comm.; **14** – v. facial.; **15** – platysma; **16** – a. carotis ext.; **17** – r. margin. mandib.; **18 –** rr. buccales. n. fac.; **19** – duct. parot., a. transv. fac.; **20 –** rr. zygomat. (VII); **21** – m. masseter; **22** – n. auriculotemp.; **23** – rr. temporales n. facialis

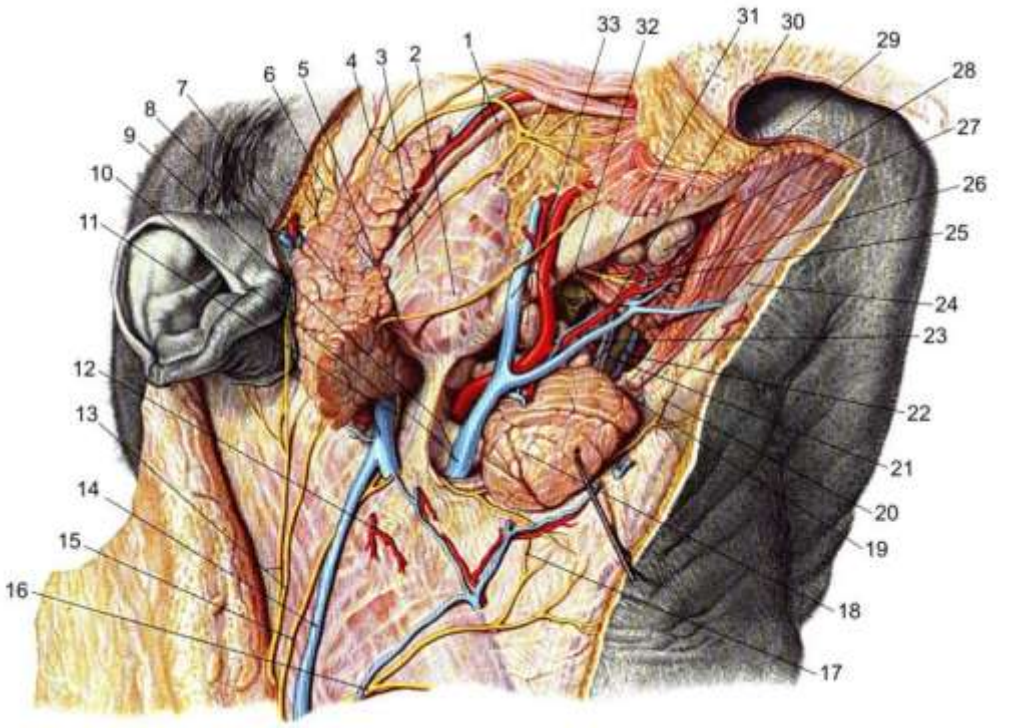
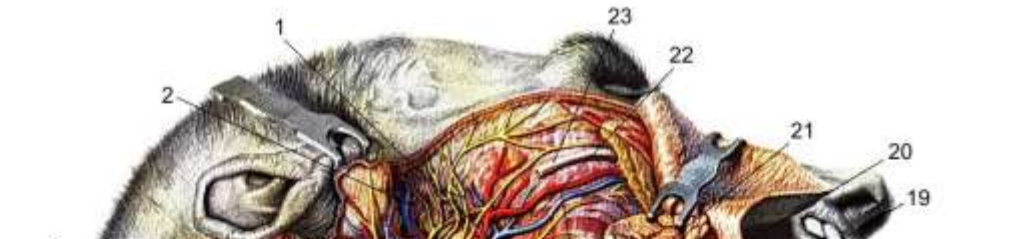


Figure 7 – Trigonum submandibulare. Gl. submandibularis, vessels and nerves:
1 − ductus parotideus, a. transversa faciei; **2** − m. masseter, fascia masseterica; **3** − rr. buccales nervi facialis; **4** − rr. zygomaticus nervi facialis; **5** − r. marginalis mandibulae (VII); **6** − rr. temporalis nervi facialis; **7** − glandula parotis; **8** − a., v. temporalis superficialis, n. auriculotemporalis; **9** − m. digastricus, a. facialis; **10** − v. facialis; **11** − v. retromandibularis, r. colli nervi facialis; **12** − a. sternocleidomastoidea; **13** − n. auricularis magnus; **14** − v. jugularis externa; **15** − n. transv. colli (ram. sup.); **16** − n. transversus colli; **17** − ansa cervicalis superficialis; **18** − fascia cervicalis (submandib.); **19** − m. digastricus; **20** − n. transversus colli; **21** − n. hypoglossus, v. comitans n. hypoglossi; **22** − trigonum a. lingualis (m. hyoglossus); **23** − ductus submandibularis, processus unciatus glandulae submandibularis; **24** − fascia colli; **25** − a. sublingualis; **26** − m. mylohyoideus; **27** − m. digastricus (venter ant.); **28** − nodi lymph. submandibulares ant.; **29** − margo mandibulae; **30** − a., v. submentalis, n. mylohyoideus; **31** − ganglion submandibulare, rr. glandulares; **32** − n. lingualis, rami ad ganglion submandib.; **33** − a., v. facialis



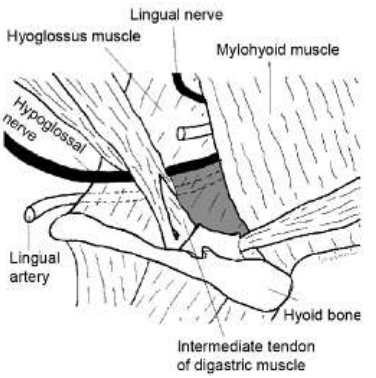


Figure 9 – The Pyrogov's triangle

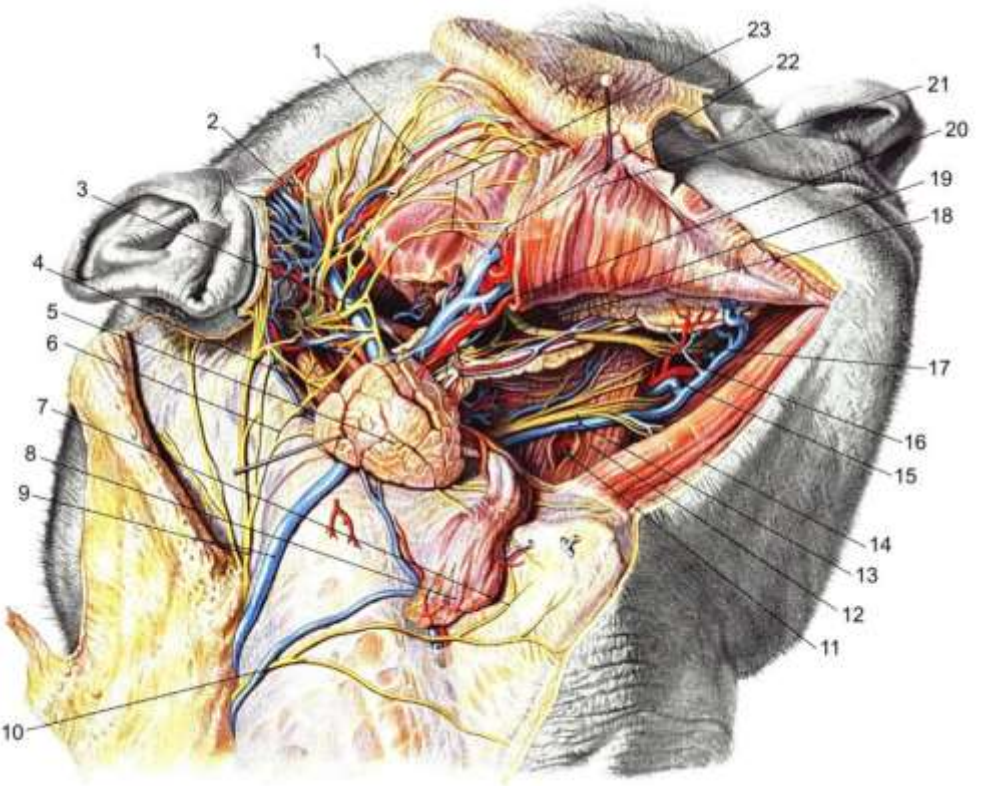


Figure 10 – A. lingualis in Pyrogov triangle:
1 – a., v. transv. faciei, rr. orbit. n. facialis; **2** – a., v. tempor. superf., n. auriculotemp.; **3** – a. carotis ext., v. retromandib., n. facialis; **4** – a. occip., m. digastricus, r. digastr. n. fac.; **5** – gland. submandib.; **6** – ram. comm.: n. fac. **–** n. auricul. magnus; **7** – ansa cervic. superf.; **8** – m. digastricus; **9** – v. jugul. ext., n. auricul. magnus; **10** – n. transversus colli; **11** – a., v. lingualis; **12** – m. hyoglossus; **13** – n. hypoglossus, v. comit. n. h.; **14** – m. mylohyoideus; **15** – v. lingualis, v. comitans XII; **16** – a. subling. (a.ling.); **17** – n. lingualis; **18** – n. lingualis, gangl. submandib., rr. submand. (nerv.); **19** - rr. submand. a. facialis, ductus submand.; **20** – a. submentalis; **21** – m. mylohyoideus; **22** – a., v. facialis; **23** – m. masseter, rr. buccales, r. margin. mand. (VII)

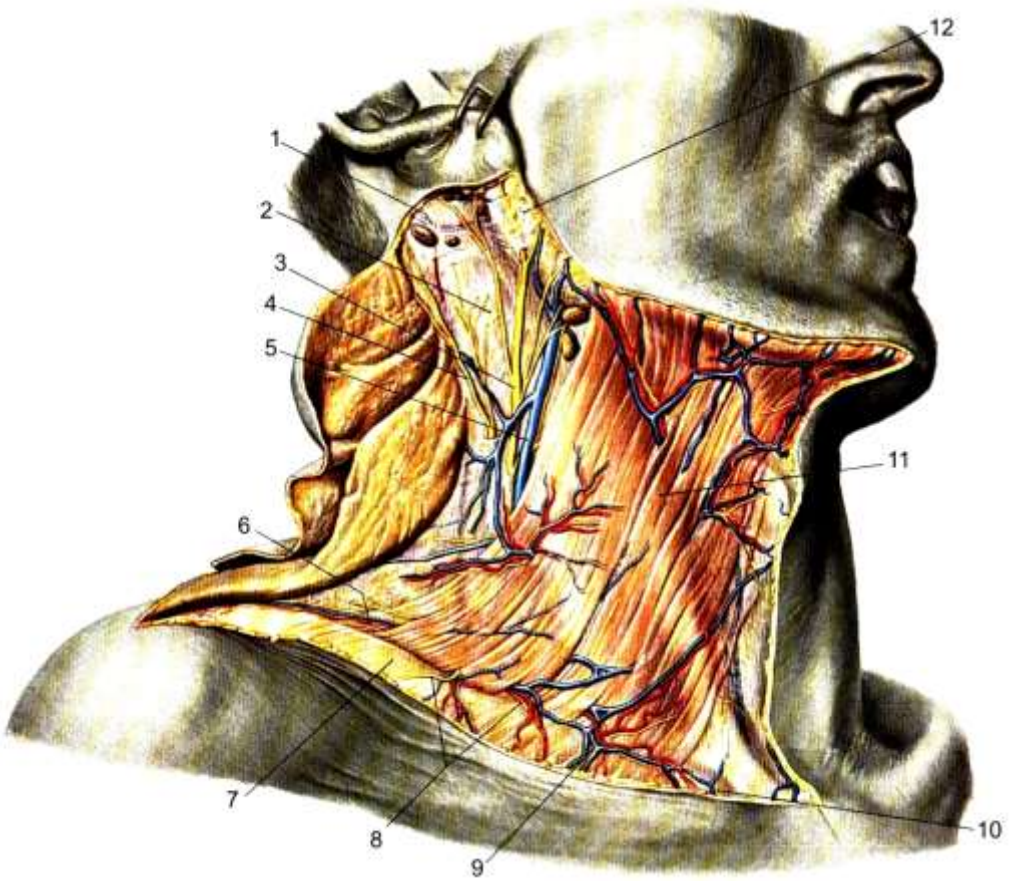


Figure 11 – Trigonum caroticum. Superficial vessels and nerves:
1 − a. auricularis post.; **2** − m. sternocleidomastoideus; **3** − n. auricularis magnus; **4** − n. occipitalis minor; **5** − v. jugularis ext.; **6** − nn. supraclaviculares post., a. cervicalis superfic.; **7** − platysma; **8** − nn. supraclaviculares medii; **9** − nn. supraclaviculares ant., a. cervicalis superfic.; **10** − clavicula (extremitas sternalis); **11** − platysma; **12** − capsula gland. parotis

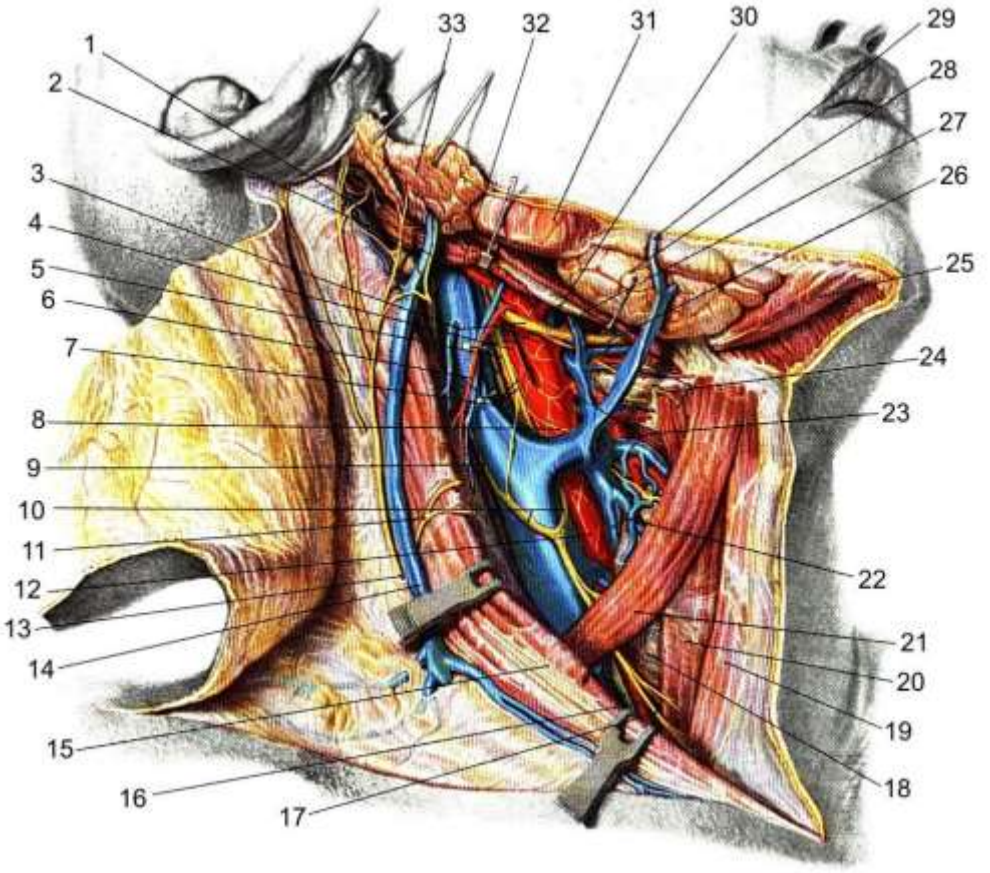


Figure 12 – Topography of carotid triangle:
1 − m. digastricus, r. digastricus (VII); **2** − v. jugul. ext., r. colli n. fac.; **3** − arcus n. hypoglossi, a. carot. ext., plexus car. ext.; **4** − a. carotis int., sinus carotici; **5** − n. vagus, r. cardiac. sup. n. v.; **6** − a., v. sternocleidomast.; **7** − radix sup. ansae cervic. (prof.), r. cardiacus; **8** − rad. sup. ansae cerv.; **9** − rad. inf. ansae cervic. (prof.); **10** − ansa cervic.; **11** − n. transversus colli; **12** − a. carotis comm., plexus carot.; **13** − n. auricul. magnus; **14** − v. jugul. ext.; **15** − m. sternocleidomast.; **16** − n. vagus, a. carotis comm.; **17** − rami musc. ansae cerv.; **18** − gland. thyreoidea; **19** − m. sternohyoideus; **20** − m. sternothyr.; **21** − m. omohyoid. (venter sup.); **22** − v. thyr. sup., polus sup. gl. thyr.; **23** − a., v. thyr. sup., a., v., n. laryng. sup. (r. int.), membr. thyreohyoidea; **24** − m. thyreohyoid., cornu maj. o. hyoidei; **25** − m. digastricus (venter ant.), m. mylohyoid.; **26** − n. hypoglossus, v. comit. n. h.; **27** − a. lingualis, v. palat. ascend.; **28** − gland. submandib.; **29** − v. facialis; **30** − a. facialis; **31** − m. masseter; **32** − v. jugul. int.; **33** − gland. parotis

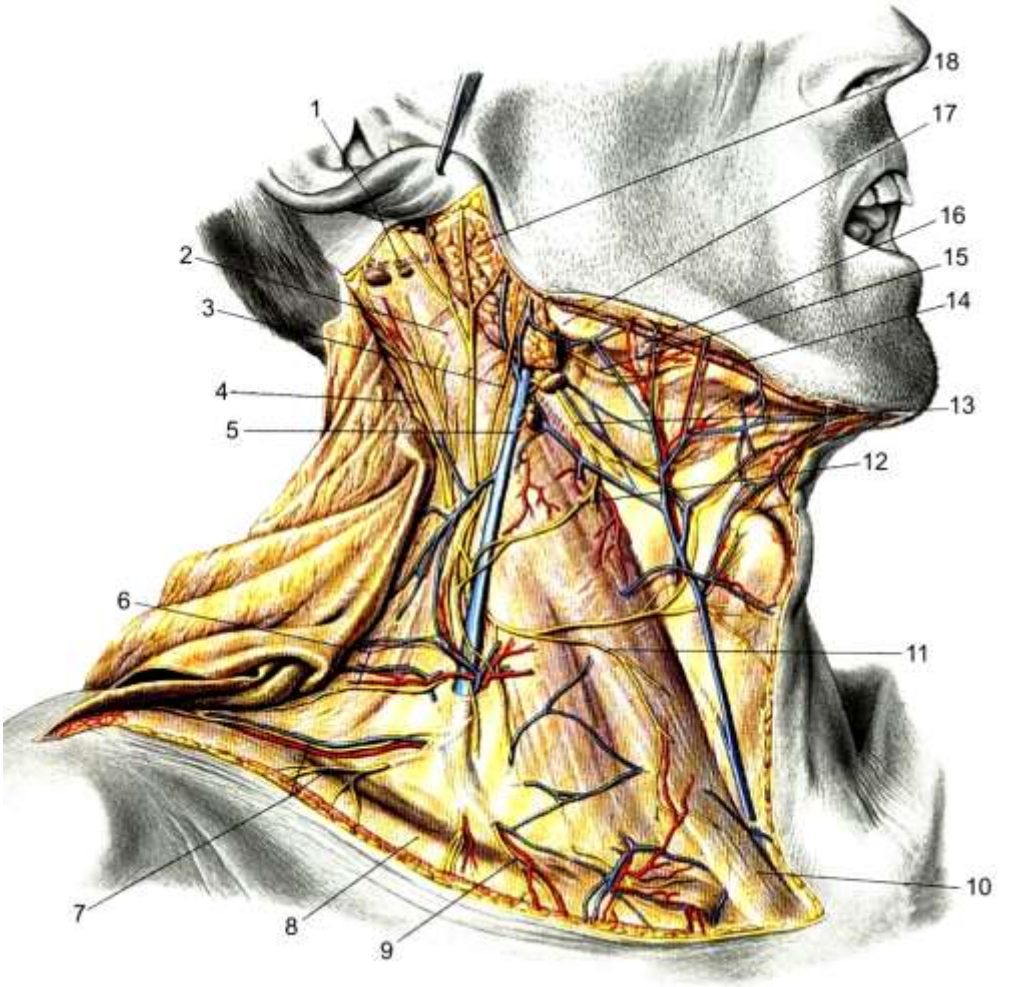


Figure 14 – Sternocleidomastoid region, lateral triangle of the neck. Superficial vessels and nerves: **1** − a., v. auricularis post.; **2** − m. sternocleidomastoideus; **3** − n. auricularis magnus; **4** − n. occipitalis minor; **5** − v. jugularis externa; **6** − a. cervicalis superficialis; **7 –** nn. supraclaviculares post., a. cervicalis superficialis; **8** − clavicula; **9** − nn. supraclaviculares medii; **10** − m. sternocleidomastoideus; **11** − n. transversi colli; **12** − ansa cervicalis superficialis (ramus sup. n. transversi colli); **13** − ramus colli nervi facialis; **14** − platysma; **15** − ramus marginalis mandibulae; **16** − a., v. facialis; **17** − angulus mandibulae; **18** − glandula parotis

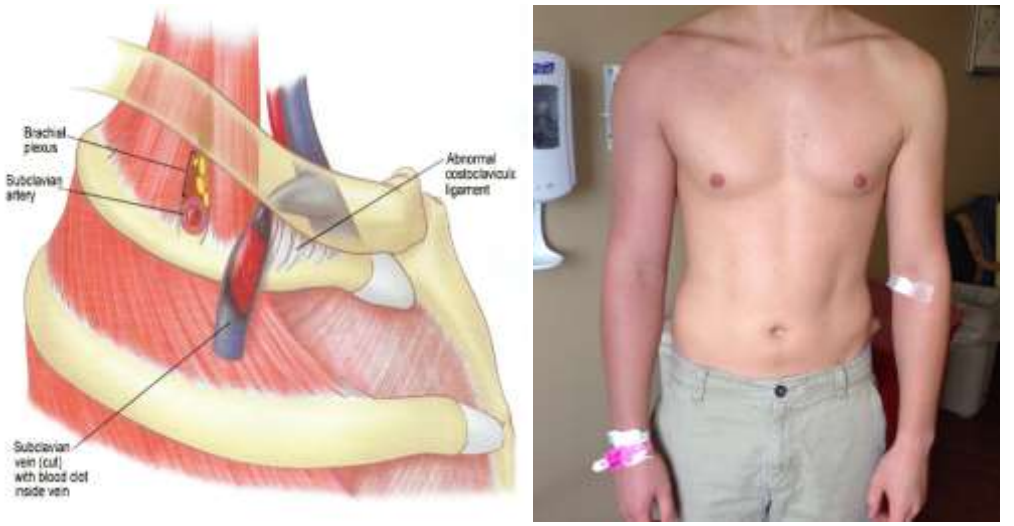


Figure 16 – Paget-Schroetter disease

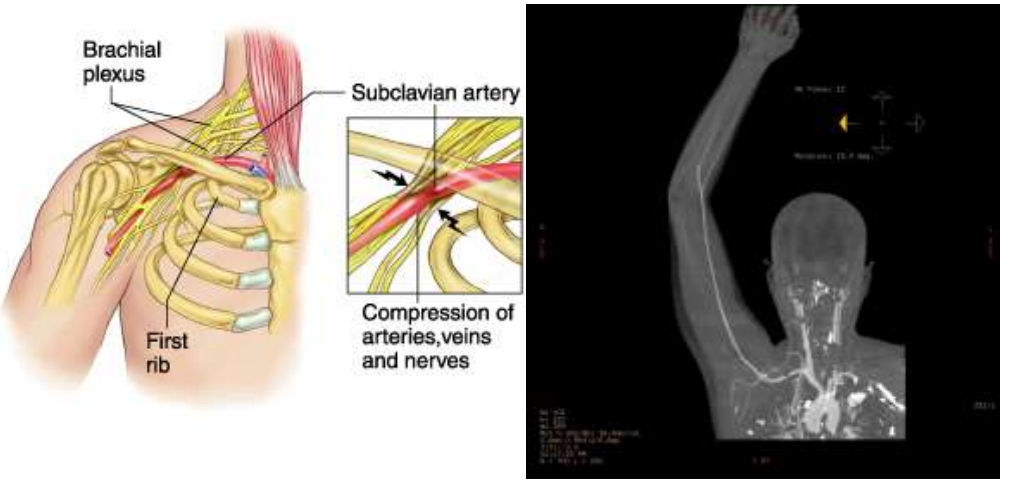


Figure 17 – Thoracic outlet syndrome

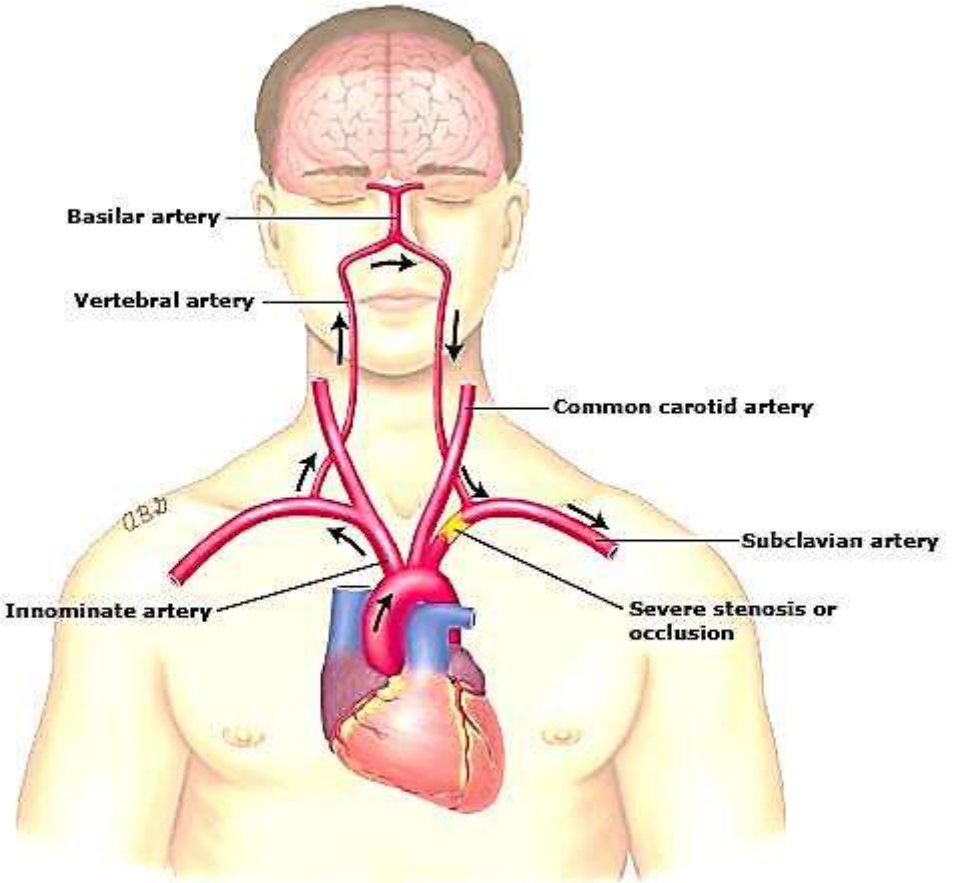


Figure 18 – Subclavian steal syndrome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39
38
37
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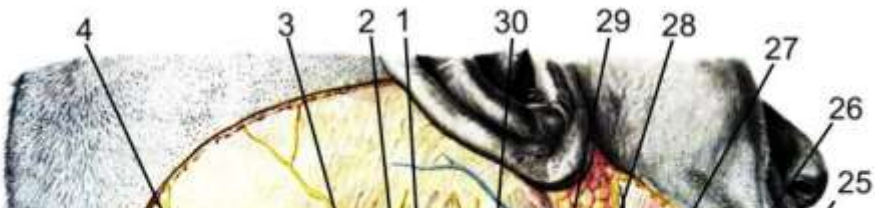
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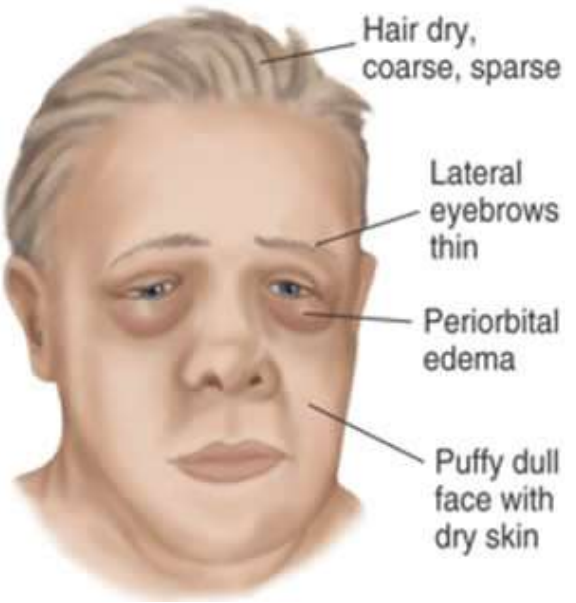

Figure 24 – Hypothyroidism

TEST QUESTIONS

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Identify the upper boundary of carotid triangle:
Posterior venter of m. digastricus;
Sternocleidomastoid muscle;
Anterior venter of m. digastricus;
Inferior venter of m. omohyoideus.

What is carotid triangle limited externally by:
M. sternocleidomastoideus;
Posterior venter of m. digastricus;
Superior venter of m. omohyoideus;
Inferior venter of m. omohyoideus?

What is carotid triangle limited from below by:
Superior venter of m. omohyoideus;
Inferior venter of m. omohyoideus;
M. sternocleidomastoideus;
Posterior venter of m. digastricus?

Identify the upper boundary of trigonum omotracheale:
Superior venter of m. omohyoideus;
M. sternocleidomastoideus;
Anterior venter of m. digastricus;
Inferior venter of m. omohyoideus.

Identify the external wall of trigonum omotracheale:
M. sternocleidomastoideus;
Superior venter of m. omohyoideus;
Inferior venter of m. omohyoideus;
Anterior venter of m. digastricus.

Identify the middle border of trigonum omotracheale:
Middle line of the neck;
Superior venter of m. omohyoideus;
Anterior venter of m. digastricus;
M. sternocleidomastoideus.
Identify the posterior boundary of trigonum omotrapezoideum:

M. trapezius;
M. sternocleidomastoideus;
Inferior venter of m. omohyoideus;
Posterior venter of m. digastricus.

Identify the anterior boundary of trigonum omotrapezoideum:
M. sternocleidomastoideus;
Superior venter of m. omohyoideus;
Inferior venter of m. omohyoideus;
Posterior venter of m. digastricus.

Identify the lower boundary of trigonum omotrapezoideum:
Inferior venter of m. omohyoideus;
Posterior venter of m. digastricus;
M. trapezius;
M. sternocleidomastoideus.

Identify the upper boundary of trigonum omoclaviculare:
Inferior venter of m. omohyoideus;
Superior venter of m. omohyoideus;
Posterior venter of m. digastricus;
M. sternocleidomastoideus.

Identify the anterior boundary of trigonum omoclaviculare:
M. sternocleidomastoideus;
Middle line of the neck;
Inferior venter of m. omohyoideus;
Clavicle.

Identify the lower boundary of trigonum omoclaviculare:
Clavicle;
M. sternocleidomastoideus;
Inferior venter of m. omohyoideus;
M. trapezius.

Identify fascia of submandibular triangle:

Fascia colli superficialis, lamina superficialis fasciae colli propriae;
Lamina superficialis fasciae colli propriae, lamina profunda fasciae colli propriae;
Lamina profunda fasciae colli propriae, fascia colli superficialis;
Fascia endocervicalis, fascia prevertebralis.

Identify fascia of carotid triangle:
Fascia colli superficialis, lamina superficialis fasciae colli propriae, fascia endocervicalis, fascia prevertebralis;
Fascia colli superficialis, lamina superficialis fasciae colli propriae, lamina profunda fasciae colli propriae, fascia endocervicalis;
Fascia colli superficialis, lamina superficialis fasciae colli propriae, lamina profunda fasciae colli propriae, fascia prevertebralis;
Fascia colli superficialis, lamina superficialis fasciae colli propriae, lamina profunda fasciae colli propriae, fascia endocervicalis, fascia prevertebralis.

Identify fascia that is not a part of trigonum omotracheale:
Fascia thoracolumbalis;
Fascia colli superficialis;
Fascia endocervicalis;
Fascia prevertebralis.

Identify fascia of trigonum omotrapezoideum:
Fascia colli superficialis, lamina superficialis fasciae colli propriae, fascia prevertebralis;
Fascia colli superficialis, lamina superficialis fasciae colli propriae, lamina profunda fasciae colli propriae;
Fascia colli superficialis, lamina superficialis fasciae colli propriae, fascia endocervicalis;
Fascia colli superficialis, fascia endocervicalis, fascia prevertebralis.

Identify fascia which is not a part of trigonum omoclaviculare:
Fascia endocervicalis;
Fascia colli superficialis;
Fascia prevertebralis;
Lamina superficialis fasciae colli propriae.

What fascia forms a compartment for m. platysma:

Fascia colli superficialis;
Lamina superficialis fasciae colli propriae;
Fascia prevertebralis;
Lamina profunda fascia colli propriae?

What fascia forms a compartment for sternocleidomastoid muscle:
Lamina superficialis fasciae colli propriae;
Fascia prevertebralis;
Lamina profunda fasciae colli propriae;
Fascia colli superficialis?

What fascia forms a capsule of submandibular gland:
Lamina superficialis fasciae colli propriae;
Lamina profunda fasciae colli propriae;
Fascia colli superficialis;
Fascia endocervicalis?

What fascia forms muscle sheath located below hyoid bone:
Lamina profunda fasciae colli propriae;
Lamina superficialis fasciae colli propriae;
Fascia colli superficialis;
Fascia prevertebralis?

What fascia forms the sheath of neurovascular bundle of the neck:
Parietal leaf of internal cervical fascia;
Visceral leaf of f. endocervicalis;
Fascia prevertebralis;
Lamina profunda fasciae colli propriae?

What fascia forms the sheath of scalene muscles:
Fascia prevertebralis;
Fascia endocervicalis;
Parietal leaf of f. endocervicalis;
Lamina profunda fasciae colli propriae?

What fascia forms the sheath of a. et. v. subclavia and plexus brachialis:

Fascia prevertebralis;
Parietal leaf of f. endocervicalis;
Visceral leaf of f. endocervicalis;
Lamina profunda fasciae colli propriae?

What is identified in the interaponeurotic space:
Arcus venosus juguli;
V. jugularis anterior;
V. jugularis externa;
V. jugularis interna?

What cellular tissue is located between the leaves of the second and third fascia of the neck above the
jugular incisure of sternum:
Spatium interaponeuroticum suprasternale;
Gruber cul-de-sac;
Spatium pretracheale;
Spatium vasonervorum?

What dissectiont is used to reveal abscess of episternal interaponeurotic space:
Transversal dispart above the jugular incisure of sternum;
Middle line of the neck;
Along the anterior margin of sternocleidomastoid muscle;
Along the posterior margin of sternocleidomastoid muscle?

What cellular tissue is identified behind the space of sternocleidomastoid muscle between the II and III fascia of the neck:
Gruber cul-de-sac;
Spatium interaponeuroticum suprasternale;
Spatium pretracheale;
Spatium retroviscerale?

What cellular tissue is identified between the parietal and visceral leaves of the IV fascia of the neck:
Spatium previscerale;
Spatium retroviscerale;

Spatium vasonervorum;
Spatium prevertebrale?

What is identified in spatium pretracheale:
Plexus venosus thyreoideus impar, a. thyreoidea ima, truncus brachiocephalicus, a. carotis communis dextra, thymus;
Plexus venosus thyreoideus impar, a. subclavia, a. thyreoidea ima, truncus brachiocephalicus, thymus;
Plexus venosus thyreoideus impar n. phrenicus, a. thyreoidea ima, truncus brachiocephalicus, thymus;
Plexus venosus thyreoideus impar, a. thyreoidea ima, trunku brachiocephalicus, a. subclavia, n. phrenicus?

What dissection is used to reveal abscess of previsceral cellular space:
Transverse incision 2 cm above the jugular incisure of sternum;
Middle line on the neck;
De Quervain's incision;
Kiuttner's incision?

What incision is used to reveal submandibular abscess:
2 cm from the margin of the lower jaw;
Incision at the level of upper margin of the thyroid cartilage to the anterior margin of the sternocleidomastoid muscle;
Incision at the level of upper margin of the thyroid cartilage and further along the anterior margin of sternocleidomastoid muscle;
Kocher's incision?

What incision is used to reveal abscess of sternocleidomastoid muscle (Bezold's abscess):
Incision at the level of upper margin of the thyroid cartilage and further along the anterior margin of sternocleidomastoid muscle above the swelling;
Kocher's incision;
Transverse incision 2 cm above the jugular incisure of sternum;
Incision from the upper margin of the thyroid cartilage to the middle line of the neck?

What incision is used to reveal abscess of lateral triangle of the neck:

Incision above the collarbone and parallel from the posterior margin of sternocleidomastoid muscle to the anterior margin of trapezius muscle;
Incision from the upper margin of the thyroid cartilage and further along the anterior margin of sternocleidomastoid muscle;
Incision under the collarbone dissecting the skin layer−by−layer, subcutaneous cellular tissue, and subcutaneous muscle;
Arciform incision (Kiuttner's incision)?

What incision is used to reveal abscess of retrovisceral cellular space:
Incision at the level of upper margin of the thyroid cartilage and further along the anterior margin of sternocleidomastoid muscle;
Transverse incision 2 cm above the jugular incisure of sternum along the middle line of the neck;
Kocher's incision?

How can the abscess of neurovascular fascicle in cellular space be revealed:
Incision is performed on the anterior or posterior margin of sternocleidomastoid muscle;
Kocher's incision;
Transverse incision 2 cm above the jugular incisure of sternum over the collarbone and parallel from the posterior;
Margin of sternocleidomastoid muscle to the anterior margin of trapezius muscle?

What is identified in the cellular tissue of lateral triangle between the II and V fascia of the neck:
V. jugularis externa, n. accessorius, nn. supraclavicularis, a. et v. cervicalis superficialis;
V. jugularis externa, n. accessorius, nn. supraclavicularis, a. et v. cervicalis superficialis, a. et v. suprascapularis;
V. jugularis externa, a. et v. subclavia, plexus brachialis n. accessorius, nn. supraclavicularis;
V. jugularis externa, a. et v. subclavia, a. et v. cervicalis superficialis, a. et v. cervicalis suprascapularis, n. accessorius?

What is identified in the cellular tissue of lateral triangle between the III and V fascia of the neck:
V. jugularis externa, a. et v. cervicalis superficialis, a. et v. suprascapularis;
V. jugularis externa, a. et v. cervicalis superficialis, a. et v. suprascapularis, nn. supraclaviculares, n. accessorius;
V. jugularis externa, a. et v. cervicalis superficialis, n. accessorius, mm. scaleni anterior, middle et posterior;
V. jugularis externa, a. et v. cervicalis superficialis, a. et v. suprascapularis, a. et v. subclavia, plexus brachialis?

What is identified under the V fascia in tr. omoclaviculare:
A. et v. subclavia, plexus brachialis;
A. et v. subclavia, plexus brachialis, a. et v. suprascapularis;
A. et v. subclavia, plexus brachialis, a. et v. cervicalis superficialis;
A. et v. subclavia, plexus brachialis, a. et v. cervicalis superficialis, a. et v. suprascapularis?

What is identified in spatium prevertebrale:
Mm. longus colli, mm. longus capitis, truncus sympathicus;
Mm. longus colli, mm. longus capitis, a. et v. subclavia;
Mm. longus colli, mm. longus capitis, a. et v. subclavia, pl. brachialis;
Mm. longus colli, mm. longus capitis, truncus sympathicus, pl. brachialis?

What is identified in the cellular tissue of submandibular triangle:
N. transversus colli;
N. transversus colli, r. marginalis mandibulae;
N. transversus colli, r. marginalis mandibulae, v. jugulis externa;
N. transversus colli, r. marginalis mandibulae, a. et v. facialis?

What is identified under the superficial leaf of the II fascia of the neck in submandibular triangle:
R. marginalis mandibulae, a. et v. facialis, a. et v. submentalis, n. mylohyoideus, lymph nodes, glandula submandibularis;
A. et v. facialis, glandula submandibularis, n. mylohyoideus, n. transversus colli, a. et v. submentalis;
A et v. facialis, r. marginalis mandibulae, glandula submandibularis, a. et v. submentalis?

What are the possible ways of transmission of pus from retrovisceral space:
To retropharyngeal space and upper mediastinum;
In spatium vasonervorum and upper mediastinum;
In spatium interscalenum and lateral triangle of the neck;
In spatium antescalenum and upper mediastinum?

What cellular spaces are connected with upper mediastinum:
Spatium vasonervorum, spatium previscerale, spatium retroviscerale;
Spatium vasonervorum, spatium previscerale, spatium prevertebrale;
Spatium previscerale, spatium retroviscerale;
Spatium vasonervorum, spatium previscerale, spatium retroviscerale, spatium prevertebrale, Gruber cul-de-sac?

By what is the bed of submandibular gland limited from above:
Submandibular fossa of lower jaw;
M. mylohyoideus, m. hyoglossus;
Parotid salivary gland;
Anterior and posterior venter of m. digastricus?

By what is the bed of submandibular gland limited from below:
Anterior and posterior venter of m. digastricus;
Fossa submandibularis;
M. mylohyoideus, m. hyoglossus;
N. hypoglossus?

By what is the bed of submandibular gland limited from behind:
Parotid salivary gland;
Fossa submandibularis;
M. mylohyoideus;
Posterior venter of m. digastricus?

What is the bed of submandibular gland limited by medially by:
M. mylohyoideus, m. hyoglossus;
Parotid gland;
Fossa submandibularis;
Anterior and posterior venter of m. digastricus?

Between what muscles does the excretory duct of submandibular gland pass:
M. mylohyoideus and m. hyoglossus;
M. mylohyoideus and posterior venter of m. digastricus;
M. mylohyoideus and m. constrictor pharyngis medius;
M. hyoglossus and m. constrictor pharyngis medius?

What runs exactly above the duct of submandibular gland:
N. lingualis;
N. hypoglossus;
A. lingualis;
V. lingualis?

What runs below the duct of submandibular gland:
N. hypoglossus, v. lingualis;
N. lingualis;
A. lingualis;
R. marginalis mandibulae?

What is the anatomic landmark for identifying the lingual artery:
Pirogov triangle;
Wharton's duct;
Posterior venter of m. digastricus;
N. hypoglossus?

What is the pus transmitted by connecting the bottom of the oral cavity with the bed of submandibular gland:
Through Wharton’s duct and anterior process of gl. submandibularis;
Through Stenon’s duct;
N. lingualis;
N. hypoglossus?

What supplies gl. submandibularis with blood:
Rr. glandulares, a. facialis, a. sublingualis, a. lingualis;
A. palatina ascendens;
A. submentalis, a. facialis;
A. facialis, a. pharyngea ascendens?

What is identified under the leaf of the II fascia of the neck in submandibular triangle:
Anterior process of submandibular gland, Wharton's duct, n. hypoglossus, v. lingualis, n. lingualis;
Wharton's duct, n. lingualis, n. hypoglossus, a. lingualis;
Wharton's duct, a. lingualis, n. hypoglossus, anterior process of gl. submandibularis, v. lingualis;
Stenon's duct, n. hypoglossus, n. lingualis, v. lingualis, a. lingualis?

What is submandibular triangle limited from above by:
Inferior margin of the lower jaw;
Anterior venter of m. digastricus;
Posterior margin of m. sternocleidomastoideus;
Posterior venter of m. digastricus?

What is submandibular triangle limited from the front by:
Inferior venter of m. digastricus;
Posterior venter of m. digastricus;
Inferior margin of the mandible;
Posterior margin of m. sternocleidomastoideus?

What is submandibular triangle limited from behind by:
Posterior venter of m. digastricus;
Inferior venter of m. omohyoideus;
Anterior margin of m. sternocleidomastoideus;
Anterior venter of m. digastricus?

What muscles compose the floor of submandibular triangle:
M. mylohyoideus, m. hyoglossus;
Anterior and posterior venter of m. digastricus;
M. stylohyoideus, m. mylohyoideus;
M. hyoglossus, m. digastricus?

Identify the boundaries of Pirogov's triangle from the anterior:
M. mylohyoideus;
Tendon of m. digastricus;
N. hypoglossus;
M. hyoglossus.

Identify the boundaries of Pirogov's triangle from below:
Tendon of m. digastricus;
M. mylohyoideus;
N. hypoglossus;
M. hyoglossus.

Identify the boundaries of Pirogov's triangle from above:
N. hypoglossus, v. lingualis;
Tendon of m. digastricus;
M. mylohyoideus;
M. hyoglossus.

Identify the bottom of Pirogov's triangle:
M. hyoglossus;
M. mylohyoideus;
M. constrictor pharyngis medius;
M. stylohyoideus.

Between what muscles does a. linguslis in Pirogov's triangle pass:
Between m. hyoglossus and m. constrictor pharyngis middle;
Between m. mylohyoideus and m. hyoglossus;
Between m. constrictor pharyngis superior and m. hyoglossus;
Between m. digastricus and m. mylohyoideus?

What is necessary to do to identify a. lingualis in Pirogov's triangle:
To split the muscle fibers of m. hyoglossus bluntly;
To lead away m. digastricus;
To dissect m. mylohyoideus;
To drag away n. hypoglossus?

How is excretory duct of submandibular salivary gland called according to its author:
Wharton's duct;
Stenon's duct;
Virsung's duct;
Botalov's duct.

What is identified in subcutaneous cellular tissue of carotid triangle:
N. transversus colli, r. colli n. facialis;
R. marginalis mandibulae, n. transversus colli;
V. jugularis externa, n. transversus colli;
Nn. supraclavicularis, n. transversus colli, r. colli n. facialis?

What passes between the I and II fascia of the neck in cellular tissue of carotid triangle:
N. transversus colli, r. colli n. facialis, v. jugularis externa;
N. transversus colli, r. colli n. facialis, r. marginalis mandibulae;
N. transversus colli, nn. supraclavicularis, v. jugularis externa;
N. transversus colli, rr. colli n. facialis, r. marginalis mandibulae, v. jugularis externa?

What is a part of major neurovascular bundle of the neck:
V. jugularis interna, a. carotis communis, n. vagus;
V. jugularis externa, a. carotis communis, n. vagus;
V. jugularis interna, a. carotis interna, n. vagus;
V. jugularis interna, a. carotis communis, n. phrenicus?

Which of the elements of major neurovascular bundle of the neck is identified superficially and externally:
V. jugularis interna;
A. carotis communis;
N. vagus;
V. jugularis externa?

Identify the empty of v. jugularis interna in carotid triangle:
V. facialis communis, v. lingualis, v. thyreoidea superior, vv. pharingeae;
V. temporalis superficialis, v. facialis communis, v. thyreoidea superior, v. lingualis;
V. facialis, v. lingualis, v. retromandibularis, v. thyreoidea superior;
V. facialis, v. lingualis, vv. pharingeae, v. jugularis externa.

How does vagus nerve branch off in the carotid triangle:
Rr. pharyngei, n. laryngeus superior, rr. cardiaci superiores;
Rr. laryngeus recurrens, rr. cardiaci superiores, rr. pharyngei;
Rr. cardiaci superiores, n. transversus colli, n. laryngeus superior;
Nn. supraclaviculares, n. laryngeus superior, rr. cardiaci superiores.

What receptors compose carotid reflexogenic area:
Sinus carotidus, glomus caroticum;
Sinus caroticum;
Glomus caroticum;
Sinus caroticum, glomus caroticum, arcus aortae, truncus pulmonalis?

What nerves are involved into formation of reflexogenic area:
N. glossopharyngeus, n. vagus, truncus sympathicus;
N. glossopharyngeus, n. vagus, truncus sympathicus, n. phrenicus;
Wrisberg nerve, Vidian nerve;
N. vagus, truncus sympathicus?

What surgical operation is performed at severe case of bronchial asthma:
Nakayama's operation;
Vanakh's operation;
Coldwell-Luck's operation;
Ritter-Yanson's operation?

What muscle covers common carotid artery within the carotid triangle:
M. platysma;
M. sternocleidomastoideus;
M. sternohyoideus;
M. omohyoideus?

Identify the projection of common carotid artery:
From sternoclavicular joint to the middle distance between the angle of mandible and mastoid process;
From jugular incisure to the angle of mandible;
From jugular incisure to the mastoid process;
From sternoclavicular joint to the angle of mandible.

What runs between the I and II fascia of the neck in sternoclavicular mastoid region:
V. jugularis externa, n. transversus colli, n. auricularis magnus, n. occipitalis minor, nn. supraclaviculares;
V. jugularis externa, n. transversus colli, n. auricularis magnus, a. cervicalis superficialis, n. occipitalis minor;

V. jugularis externa, n. transversus colli, r. colli n. facialis, nn. supraclavicularis, n. occipitalis minor;
V. jugularis externa, a. cervicalis superficialis, n. occipitalis minor, nn. supraclaviculares, n. auricularis magnus?

What is identified on the anterior wall of common carotid artery:
Radix superior n. hypoglossus, cardiac branches of vagus nerve, cardiac branches of sympathetic trunk;
N. phrenicus, cardiac branches of sympathetic trunk, radix superior n. hypoglossus;
N. accessorius, cardiac branches of sympathetic trunk;
Radix superior n. hypoglossus, cardiac branches of vagus nerve and sympathetic trunk, a. cervicalis ascendens?

What is identified beneath the IV fascia of the neck in anterior and outside from v. jugularis interna and a. carotis communis in the middle third of sternocleidomastoid region:
Ansa cervicalis;
N. accessorius;
N. transversus colli;
A. et v. cervicalis superficialis?

Identify the branches of cervical plexus:
N. transversus colli, n. auricularis magnus, n. occipitalis minor, nn. supraclaviculares, n. phrenicus;
N. transversus colli, n. auricularis magnus, n. occipitalis minor, n. occipitalis major, nn. supraclaviculares;
N. transversus colli, n. suprascapularis, n. auricularis magnus, n. occipitalis minor, n. phrenicus;
N. transversus colli, n. occipitalis minor, n. auricularis posterior, nn. supraclaviculares, n. phrenicus.

Where is the superior cervical sympathetic ganglion of sympathetic trunk identified:
On m. longus capitis at the level of transverse processes of the II–IV cervical vertebrae behind the internal carotid artery middlely from n. vagus;
On m. longus colli at the level of transverse processes of the II–IV cervical vertebrae behind the internal carotid artery in anterior of n. vagus;

On m. longus capitis at the level of transverse processes of the II–IV cervical vertebrae behind the internal carotid artery outside of n. vagus;
On m. longus colli at the level of transverse processes of the II–IV cervical vertebrae in front of the internal carotid artery outside n. vagus?

Where is the middle cervical ganglion of sympathetic trunk identified:
On m. longus colli at the level of the VI cervical vertebra above the arch of a. thyreoidea inferior;
On m. longus capitis at the level of transverse processes of the II–IV cervical vertebrae behind the internal carotid artery;
On m. longus colli at the level of the VI cervical vertebra behind the internal carotid artery middlely from n. vagus;
On m. longus capitis at the level of the VI cervical vertebra in front of a. vertebralis?

Where is the intermediate cervical ganglion of sympathetic trunk identified:
Anterior surface of vertebral artery at the level of the VII cervical vertebra;
Behind vertebral artery at the level of the head of the I rib;
Behind internal carotid artery at the level of the head of the I rib;
In anterior of a. subclavia at the level of the head of the I rib?

Where is the inferior cervical ganglion of sympathetic trunk identified:
In scalene vertebral triangle at the level of the head of the I rib the behind vertebral artery and a. subclavia middlely to truncus thyreocervicalis;
In scalene vertebral triangle at the level of the VII cervical vertebra in anterior of vertebral artery laterally to truncus thyreocervicalis;
In spatium antescalenum at the level of the head of the I rib in front of a. vertebralis laterally to truncus thyreocavicalis;
In scalene vertebral triangle at the level of the head of the I rib in front of a. vertebralis medially to truncus thyreocervicalis?

What is observed at cervical osteochondrosis resulted from compression of vertebral artery and sympathetic plexus:
Barre–Lieou syndrome;
Foix syndrome;
Horner's syndrome;
Willaret's syndrome?

What is the Barre−Lieou syndrome characterized by:
Ache and parasthesia in the head and neck, dizziness, tinnitus, reduced eyesight;
Ache and parasthesia in the head and neck, torticollis, ptosis, mydriasis;
Ache and parasthesia in the head and neck, anisocoria, exophtalmusususus, reduced eyesight;
Ache and parasthesia in the head and neck, dizziness, ptosis, exophtalmus?

What is observed at irritation of sympathetic fibers in the cervical region:
Petit's syndrome;
Barre−Lieou's syndrome;
Willaret's syndrome;
Foix syndrome?

What is Petit's syndrome characterized by:
Exophtalmus, mydriasis, dilatation of palpebral fissure;
Exophtalmus, miosis, constriction of palpebral fissure;
Exophtalmus, miosis, dilatation of palpebral fissure;
Exophtalmus, torticollis, mydriasis?

What is observed when sympathetic trunk of the neck is injured:
Claude Bernard–Horner syndrome;
Foix syndrome;
Willaret's syndrome;
Barre−Lieou's syndrome?

What is Horner−Claude Bernard's syndrome characterized by:
Miosis, constriction of palpebral fissure, exophtalmus, hyperemia of face, bradicardia;
Mydriasis, dilatation of palpebral fissure, hyperemia of face, bradicardia;
Miosis, exophtalmus, tachycardia, dilatation of palpebral fissure, hyperemia of face;
Mydriasis, constriction of palpebral fissure, retraction of the pupil, tachycardia?

Where is the solution of Novocain injected at vagosympathetic block according to O. V. Vyshnevskyi:
In the cellular tissue surrounding superior cervical ganglion of sympathetic trunk, truncus symphaticus, n. vagus;

In the cellular tissue surrounding inferior cervical ganglion of sympathetic trunk, Vieussens loop, n. phrenicus;
In the cellular tissue surrounding superior cervical ganglion of sympathetic trunk, n. phrenicus, cervical plexus;
In the cellular tissue surrounding superior cervical ganglion of sympathetic trunk, cervical plexus, n. vagus, n. phrenicus?

What is spatium antescalenum limited in front and externally by:
M. sternocleidomastoideus, m. omohyoideus;
M. sternohyoideus, m. sternothyreoideus;
M. scalenus anterior, m. omohyoideus;
M. sternocleidomastoideus, m. scalenus anterior?

What is spatium antescalenum limited by in front and medially:
M. sternohyoideus, m. sternothyreoideus;
M. sternocleidomastoideus, m. omohyoideus;
M. sternocleidomastoideus, m. sternohyoideus;
M. sternohyoideus, m. scalenus anterior?

What is spatium antescalenum limited from behind by:
M. scalenus anterior;
M. scalenus medius;
M. scalenus posterior;
M. longus colli?

What is spatium antescalenum composed of:
Bulbus v. jugularis interna, v. subclavia, sinister ductus thoracicus, n. vagus, a. carotis communis;
N. phrenicus, a. cervicalis, a. ascendens, a. suprascapularis, a. cervicalis superficialis;
Bulbus v. jugularis interna v. subclavia;
V. jugularis interna, v. subclavia, n. phrenicus, a. cervicalis ascendens, a. suprascapularis?

What is the projection of n. phrenicus on the skin:
Gueneau de Mussy point, fossa supraclavicular minor, between crura of sternoclavicular mastoid muscle;

In spatium antescalenum;
In spatium interscalenum;
In trigonum scalenovertebrale?

What runs medially from n. phrenicus on the anterior surface of m. scalenus anterior:
A. cervicalis ascendens;
A. suprascapularis;
A. cervicalis superficialis;
A. thyreoidea inferior?

What runs in front of n. phrenicus:
A. suprascapularis, a. cervicalis superficialis;
Ansa subclavia;
A. cervicalis ascendens, a. suprascapularis;
Ansa cervicalis?

What is scalene vertebral triangle limited externally by:
M. scalenus anterior;
M. scalenus medius;
M. scalenus posterior;.
M. sternocleidomastoideus?

What is scalene vertebral triangle limited medially by:
M. longus colli;
M. sternocleidomastoideus;
M. sternohyoideus;
M. omohyoideus?

What is scalene vertebral triangle limited from below by:
Cervical pleura;
Clavicle;
Breast bone;
M. scalenus anterior?

What is scalene vertebral triangle limited from the front by:
V. fascia of the neck;

M. scalenus anterior;
M. sternocleidomastoideus;
M. sternohyoideus?

Identify the apex of scalene vertebral triangle:
Tuberculum caroticum;
Cervical pleura;
M. sternocleidomastoideus;
M. omohyoideus.

Identify the composition of scalene veretebral triangle:
A. subclavia, medial, intermedial and inferior ganglia of sympathetic trunk, v. vertebralis, left sternal lymphatic duct;
A. et v. subclavia medial, intermedial and inferior ganglia of sympathetic trunk, v. vertebralis, ductus thoracicus;
A. subclavia, v. jugularis interna, a. carotis communis, n. vagus, medial, intermedial and inferior ganglia of truncus sympathicus;
V. jugularis interna, v. subclavia, ductus thoracicus, n. vagus, n. phrenicus.

Identify the place of injection of the needle to perform conductive anesthesia of cervical plexus:
Middle posterior margin of m. sternocleidomastoideus;
Middle anterior margin of m. trapezius at Gueneau de Mussy's point;
Between crura of sternocleidomastoid muscle.

What runs medially from truncus thyreocervicalis crossing a. subclavia:
N. vagus;
N. phrenicus;
V. jugularis interna;

Ductus thoracicus?
What runs laterally from truncus thyreocervicalis crossing a. subclavia:
N. phrenicus;
N. vagus;
V. jugularis interna;
A. thyreoidea inferior?

What is identified at the base of truncus thyreocervicalis:
Ansa subclavia;
Ansa cervicalis;
Glomus caroticum;
Ductus thoracicus?

Identify the branches of subclavian artery in scalene vertebral triangle:
A. vertebralis, truncus thyreocervicalis, a. thoracica interna;
A. vertebralis, a. cervicalis ascendens, a. cervicalis superficialis;
A. vertebralis, a. transversa colli, a. thoracica interna truncus thyreocervicalis, a. transversus colli;
A. thyreoidea inferior.

What is located behind and medially to a. vertebralis:
Ganglion stellatum;
V. vertebralis;
Ganglion cervicale intermedium;
N. laryngeus reccurens?

Identify the branches of truncus thyreocervicalis:
A. thyreoidea inferior, a. cervicalis ascendens, a. cervicalis superficialis, a. suprascapularis;
A. thyreoidea superior, a. thoracica interna, a. vertebralis,
a. cervicalis superficialis;
A. vertebralis, a. thyreoidea inferior, a. cervicalis superficialis, a. superscapularis;
A. transversa colli, a. thyreoidea inferior, a. suprascapularis, a. thoracica interna.

What is the anterior wall of spatium interscalenum composed of:
M. scalenus anterior;
M. scalenus medius;
M. scalenus posterior;
M. sternocleidomastoideus?

What is the posterior wall of spatium interscalenum composed of:
M. scalenus medius;
M. scalenus posterior;

M. scalenus anterior;
M. sternocleidomastoideus?

What is the inferior wall of spatium interscalenum composed of:
I rib;
M. scalenus anterior;
Clavicle;
M. sternocleidomastoideus?

What is identified in spatium interscalenum:
A. subclavia, plexus brachialis;
V. subclavia, n. vagus;
A. et v. subclavia, plexus brachialis;
V. jugularis interna, n. vagus, a. carotis communis?

Identify the branches of a. subclavia in spatium interscalenum:
Truncus costocervicalis;
Truncus thyreocervicalis;
A. transversus colli;
A. vertebralis, a. thoracica interna.

Identify the branches of truncus costocervicalis:
A. cervicalis profunda, a. intercostalis suprema;
A. cervicalis superficialis, a. suprascapularis;
A. cervicalis ascendens, a. cervicalis superficialis, a. transversa colli;
A. cervicalis profunda, a. cervicalis superficialis.

Name the author of brachial plexus anesthesia:
Kulenkampff;
Lukashevych;
Oberst;
Brown.

Identify the place of injection and direction of the needle at the block of brachial plexus:
The needle is inserted above the middle of the clavicle medially and downward directly to the II thoracic vertebra;

The needle is inserted 1−1,5 cm below the middle of the clavicle laterally and downward;
The needle is inserted above the middle of the clavicle laterally and downward;
The needle is inserted 1−1,5 cm below the middle of the clavicle middlely and downward.

What nerve crosses external surface of internal jugular vein in the upper third of sternocleidomastoid region:
N. accessorius;
N. hypoglossus;
N. laryngeus superior;
Ansa cervicalis?

What nerve crosses external surface of the internal jugular vein in the middle third of sternocleidomastoid region:
Radix inferior plexus cervicalis;
Radix superior plexus cervicalis;
N. hypoglossus;
N. accessorius?

Where is the thoracic lymphatic duct at the level of apertura thoracis superior identified:
Left margin of the gullet behind a. subclavia;
Behind the gullet in front of a. subclavia;
In anterior of a. subclavia, a. carotis communis, v. jugularis interna;
Right margin of the gullet behind a. subclavian?

What is identified in anterior of thoracic duct:
A. carotis communis, v. jugularis interna, n. vagus;
A. et v. vertebralis;
Cervical pleura, a. et v. subclavia;
A. carotis interna, v. jugularis interna, cervical pleura?

Identify the place of injection to perform conductive anesthesia of cervical plexus:
Erb's point;
Gueneau de Mussy's point;

In the middle of posterior margin of sternocleidomastoid muscle;
In the middle of anterior margin of sternocleidomastoid muscle.

Identify the place of injection to perform vagosympathetic block:
Angle created by the crossing of external jugular vein with the posterior margin of sternocleidomastoid muscle;
In the middle of anterior margin of sternocleidomastoid muscle;
Erb's point;
Gueneau de Mussy's point.

What runs between the II and V fascia of the neck in tr. omotrapezoideum:
A. et v. cervicalis superficialis, branch of cervical plexus, n. accessorius;
A. et v. suprascapularis;
A. et v. subclavia, plexus brachialis;
A. et v. cervicalis ascendens, n. phrenicus?

What runs between the III and V fascia of the neck in tr. omoclaviculare:
A. et v. suprascapularis;
A. et v. cervicalis ascendens;
N. accessorius;
N. phrenicus, a. cervicalis ascendens?

What is identified beneath the V fascia in tr. omoclaviculare:
A. et v. subclavia, pl. brachialis;
A. et v. suprascapularis;
A. et v. cervicalis superficialis;
A. et v. suprascapularis, a. et v. cervicalis superficialis, n. accessories?

What is located medially from the first part of the right subclavian artery:
Trachea, a. carotis communis;
V. jugularis interna
Cervical pleura;
N. vagus?

What is identified below the first part of subclavian artery:
Cervical pleura;
I rib;

Clavicle;
V. subclavian?

What is identified in anterior of the first part of subclavian artery:
Pirogov's venous angle, n. vagus, n. phrenicus;
A. carotis communis, n. vagus, v. jugularis interna;
V. subclavia, n. vagus, truncus sympathicus;
Cervical pleura?

What is identified behind the first part of right subclavian artery:
N. laryngeus reccurens;
Pirogov's venous angle;
N. vagus, n. phrenicus;
Trachea?

What muscles cover thyroid gland:
M. sternohyoideus, m. sternothyreoideus, m. omohyoideus;
M. sternohyoideus, m. sternothyreoideus, m. thyreohyoideus;
M. sternohyoideus, m. sternothyreoideus; m. sternocleidomastoideus;
M. sternohyoideus, m. sternothyreoideus, anterior venter of m. digastricus?

What cartilages of trachea does isthmus of the thyroid gland correlate with:
2–4;
2–3;
3–4;
1–4?

What organs are involved into the thyroid gland:
Trachea, pharynx, larynx, gullet;
Trachea, pharynx, larynx;
Trachea, pharynx, gullet;
Trachea, gullet?

What is located behind the thyroid gland:
Parathyroid glands, a. thyreoidea inferior, n. laryngeus recurrens;
Parathyroid glands, a. carotis communis, n. vagus;
Parathyroid glands, a. thyreoidea inferior, n. vagus;
Parathyroid glands, a. thyreoidea inferior, thymus?

What is adjacent to the posterior medial surface of the thyroid gland:
N. laryngeus reccurens;
A. carotis communis;
N. vagus;
V. jugularis interna?

What is adjacent to the posterior lateral surface of the thyroid gland:
A. carotis communis;
Parathyroid glands;
A. thyreoidea inferior;
V. jugularis interna?

What danger faces the surgeon on the stage of ligation of the inferior thyroid artery:
Ligation of recurrent laryngeal nerve;
Ligation of vagus nerve;
Injury of common carotid artery;
Removal of parathyroid glands?

What complications may occur at complete removal of the thyroid gland:
Asphyxia, hypoparathyroidism;
Myxedema;
Grave's disease;
Claude Bernar–Horner syndrome?

Who is the author of arciform incision on the neck:
Kiuttner;
De Quervain;
Petrovskyi;
Crile?

Name the author of angular incision on the neck:
De Quervain;
Petrovskyi;
Crile;
Kiuttner.

Name the authors of T−like incision on the neck:
Petrovskyi, Crile;
De Quervain, Kiuttner;
Crile, de Quervain;
Petrovskyi, Kiuttner.

How is Kiuttner's incision performed:
From the posterior margin of sternocleidomastoid muscle 2 cm below the mastoid process crossing sternocleidomastoid muscle and along the anterior margin to jugular incisure of the breastbone;
At the level of sublingual bone conducting along the anterior margin of sternocleidomastoid muscle, behind the breastbone, and then along the clavicle to the anterior margin of trapezius muscle;
At the level of superior margin of the thyroid cartilage conducting along the anterior margin of sternocleidomastoid muscle;
Transverse incision 2 cm above the jugular incisure of the breastbone, layer–by−layer penetrating into the III and IV fascia of the neck which are moved apart?

How is de Quervain's incision performed:
At the level of sublingual bone, conducting along the anterior margin of sternocleidomastoid muscle, behind the breastbone and along the clavicle to the anterior margin of trapezius muscle;
From the posterior margin of sternocleidomastoid muscle 2 cm below mastoid process crossing sternocleidomastoid muscle and along the anterior margin to jugular incisure of the breastbone;
From the superior margin of the thyroid cartilage along the anterior margin of sternocleidomastoid muscle;
Transverse incision 2 cm above the jugular incisure of the breastbone, layer–by−layer penetrating into the III and IV fascia of the neck which are moved apart?

How is Kocher incision performed:
3 cm above the incisure of the breastbone in the transverse direction on the inferior skin fold of the neck between internal margins of sternocleidomastoid muscle;

From the superior margin of the thyroid cartilage conducting along the anterior margin of sternocleidomastoid muscle;
From the posterior margin of sternocleidomastoid muscle 2 cm below mastoid process crossing sternocleidomastoid muscle and along its anterior margin to jugular incisure of the breastbone;
At the level of sublingual bone along the anterior margin of sternocleidomastoid muscle, behind the breastbone conducting along the clavicle to the anterior margin of trapezius muscle?

How is Diakonov's incision performed:
Below the margin of the mandible, then downward along the anterior margin of sternocleidomastoid muscle to jugular incisure of the breastbone and turning back along the clavicle to the anterior margin of trapezius muscle;
3 cm above incisure of the breastbone in the transverse direction on the inferior skin fold of the neck between internal margins of sternocleidomastoid muscle;
At the level of sublingual bone, along the anterior margin of sternocleidomastoid muscle, turning back at the breastbone conducting along the clavicle to the anterior margin of trapezius muscle;
At the level of superior margin of the thyroid cartilage and along the anterior margin of sternocleidomastoid muscle to jugular incisure of the breastbone?

Where are the superior parathyroid glands identified:
On the posterior surface of the thyroid gland between the capsule and visceral leaf of the IV fascia of the neck at the level of cricoid cartilage, in the middle between superior pole and isthmus;
On the posterior surface of the thyroid gland between the capsule and visceral leaf of the IV fascia of the neck at the level of isthmus of thyroid gland;
On the posterior surface of the thyroid gland between the capsule and visceral leaf of the IV fascia of the neck at the level of sublingual bone;
On the posterior surface of the thyroid gland between parietal and visceral leaves of the IV fascia of the neck at the middle distance between the superior pole and isthmus?

Where are the inferior parathyroid glands identified:
At the inferior pole of the gland at the entrance to a. thyreoidea inferior;
On the posterior surface of the thyroid gland at the level of isthmus;

At the level of sublingual bone;
At the inferior pole of the gland at the level cricoid cartilage?

What is the posterior entrance to the larynx limited by:
Apex of arytenoid cartilages;
Epiglottis;
Plicae aryepiglotticae;
Membrana thyreohyoidea?

What is the lateral entrance to the pharynx limited by:
Plicae aryepiglotticae;
Epiglottis;
Cricoid cartilage;
Apex of arytenoid cartilages?

Within what measures with regard to vertebral column is the larynx in adults identified:
IV–VI cervical vertebrae;
III–VI cervical vertebrae;
II–IV cervical vertebrae;
IV–VII cervical vertebrae?

What is identified in front of the pharynx:
M. sternohyoideus, m. sternothyreoideus, m. thyreohyoideus, pyramid part of the thyroid gland;
M. sternohyoideus, m. sternothyreoideus, m. omohyoideus, m. thyreohyoideus;
M. sternohyoideus, m. sternothyreoideus, m. sternocleidomastoideus;
M. sternohyoideus, m. sternothyreoideus, m. thyreohyoideus, m. omohyoideus, m. sternocleidomastoideus?

What is identified behind the larynx:
Pharynx, esophagus;
Parts of the thyroid gland;
A. carotis communis, n. vagus, v. jugularis interna;
Pharynx, esophagus, a. thyreoidea inferior?

What is identified laterally from the larynx:
Parts of the thyroid gland, a. carotis communis;
A. carotis communis, m. sternohyoideus, m. sternothyreoideus;

Parts of the thyroid gland, m. sternohyoideus, m. sternothyreoideus;
A. carotis communis, n. vagus, v. jugularis interna?

Where does the cervical region of trachea begin:
At the level of the VI cervical vertebra;
At the level of the IV cervical vertebra;
At the level of the III cervical vertebra;
At the level of the V cervical vertebra?

At what level bifurcation of trachea is related to vertebral column identified:
At the level of the V thoracic vertebra;
At the level of the IV thoracic vertebra;
At the level of the VI thoracic vertebra;
At the level of the VII thoracic vertebra?

What is identified in front of trachea:
M. sternohyoideus, m. sternothyreoideus, thyroid gland and its isthmus, pretracheal cellular tissue;
M. sternohyoideus, m. sternothyreoideus, m. thyreoideus, thyroid gland its isthmus, pretracheal cellular tissue;
M. sternohyoideus, m. sternothyreoideus, m. omohyoideus, thyroid gland and its isthmus;
M. sternohyoideus, m. sternothyreoideus, m. sternocleidomastoideus, thyroid gland and its isthmus?

What is identified in pretracheal cellular tissue:
A. thyreoidea ima, plexus venosus, thyreoideus impar, vv. thyreoidea inferiores, thymus, v. brachiocephalica sinistra, truncus brachiocephalicus;
A. thyreoidea ima, plexus venosus, thyreoideus impar, vv. thyreoidea inferiores, v. jugularis interna, v. brachiocephalica sinistra, truncus brachiocephalicus;
A. thyreoidea ima, vv. thyreoideus inferiores, n. vagus, v. brachiocephalica sinistra, truncus brachiocephalicus;
A. thyreoidea ima, vv. thyreoideus inferiores, v. jugularis interna, n. vagus, n. laryngeus recurrens?

What rings of trachea are dissected at superior tracheotomy:
II–III;
I–II;

III–IV;
I–II–III?

What is the procedure of performing superior tracheotomy:
The II and III rings of trachea are dissected; the trachea is punctured by a scalpel approximately 1 cm in depth cutting surface is directed cranially;
The II and III rings of trachea are dissected, cutting surface is directed caudally;
The I and II rings of trachea are dissected with a scalpel about 1 cm in depth, cutting surface is directed parallel;
The II and IV rings of trachea are dissected with a scalpel about 1 cm in depth, cutting surface is directed cranially?

Identify cellular spaces on the way to trachea at inferior tracheotomy:
Spatium interaponeuroticum suprasternale, spatium pretracheale;
Spatium interaponeuroticum suprasternale, spatium pretracheale, spatium retroviscerale;
Saccus caecus retrosternocleidomastoideus, spatium pretracheale;
Spatium interaponeuroticum suprasternale, spatium pretracheale, spatium prevertebrale.

What complications can occur at tracheotomy:
Subcutaneous emphysema, necrosis of cartilages, aspiration pneumonia, bleeding, asphyxia, injury of esophagus;
Bleeding, dysphagia, necrosis of cartilages, aspiration pneumonia, asphyxia, injury of esophagus, torticollis;
Hemimimia, bleeding, dysphagia, asphyxia, injury of esophagus, necrosis of cartilages;
Subcutaneous emphysema, dysphagia, bleeding, necrosis of cartilages, hemiglossoplegia, pneumonia?

What is identified in front of the cervical part of esophagus:
Cricoid cartilage, trachea, left recurrent nerve;
Parts of the thyroid gland, trachea, left recurrent nerve;
Trachea, v. brachicephalica sinistra, common carotid arteries;
Trachea, right recurrent nerve, parts of the thyroid gland?

What is identified laterally to the cervical part of esophagus:
Right recurrent nerve, lateral parts of the thyroid gland, a. thyreoidea inferior, a. carotis communis, ductus thoracicus;
Left recurrent nerve, lateral parts of the thyroid gland, a. carotis communis, v. jugularis interna, n. vagus;
Lateral parts of the thyroid gland, a. carotis communis, n. vagus, a. thyreoidea inferior, v. jugularis interna;
Lateral parts of the thyroid gland, a. carotis communis, trachea, mediastinal pleura, right recurrent nerve?

At what level with regard to vertebral column is the cervical part of esophagus identified:
From the VI cervical to the II thoracic vertebra;
From the IV cervical to the I thoracic vertebra;
From the V cervical to the I thoracic vertebra;
From the VII cervical to the III thoracic vertebra?

What is identified behind the cervical part of esophagus:
Vertebral column, m. longus colli, spatium retroviscerale, fascia prevertebralis;
Vertebral column, m. longus capitis, spatium retroviscerale, fascia prevertebralis;
Vertebral column, pharynx, m. longus colli, fascia prevertebralis, spatium retroviscerale;
Vertebral column, m. longus colli, fascia prevertebrale, n. laryngeus recurrens?

How is the wall of esophagus sutured:
First layer of interrupted sutures is put on all layers of the wall, second layer on adventitia and muscle coat;
By single-layer interrupted suture;
By two-layer transverse suture;
First layer of interrupted sutures is put on the mucous membrane, second layer on adventitia and muscle coat?

What incision is performed to expose cervical part of esophagus:
Along the anterior margin of sternocleidomastoid muscle, to the left from the jugular incisure of the breastbone to the superior margin of the thyroid cartilage;

Transverse incision above the jugular incisure of the breastbone between the internal margins of sternocleidomastoid muscles;
Incision 5-6 cm in length is performed in the inferior region of the lateral surface of the neck;
Incision 5-6 cm in length is performed from the apex of the thyroid cartilage and then downwards?

What incision is performed to expose common carotid artery:
Along the anterior margin of sternocleidomastoid muscle from the superior margin of the thyroid cartilage 5-6 cm in length;
Along the anterior margin of sternocleidomastoid muscle from the angle of mandible 5-6 cm in length;
Petrovskyi incision;
Kiuttner's incision?

What layers are dissected to expose common carotid artery:
Skin, subcutaneous cellular tissue, the I fascia of the neck, m. platysma, the II fascia of the neck, parietal plate of the IV fascia of the neck;
Skin, subcutaneous cellular tissue, the I fascia of the neck, m. platysma, the II fascia of the neck, the III fascia of the neck, m. omohyoideus, parietal plate of the IV the fascia of the neck;
Skin, subcutaneous cellular tissue, the I fascia of the neck, m. platysma, the II fascia of the neck, m. sternocleidomastoideus, the III fascia of the neck, m. omohyoideus, parietal plate of the IV fascia of the neck;
Skin, subcutaneous cellular tissue, the I fascia of the neck, m. platysma, the II fascia of the neck, m. sternocleidomastoideus, the III fascia of the neck, m. omohyoideus, parietal and visceral plates of the IV fascia of the neck?

What anatomical formations should be taken into account at exposing esophagus:
A. thyreoidea inferior sinistra, n. laryngeus reccurens;
A. carotis communis, v. jugularis interna, n. vagus;
A. carotis externa, v. jugularis interna, n. laryngeus reccurens;
A. thoracica interna, n. laryngeus reccurens?

What arteries at the base of the brain are important in general blood circulation at ligation of common carotid artery:
A. communicans anterior, a. communicans posterior;
A. cerebri anterior, a. communicans anterior, a. cerebri posterior, a. communicans posterior;

A. cerebri media, a. communicans anterior, a. cerebri posterior, a. communicans posterior;
A. cerebri anterior, a. cerebri media, a. cerebri posterior?

What anastomoses of retrocranial arteries with intracranial ones are important in general blood circulation at ligation of common carotid artery:
A. dorsalis nasi with a. angularis, a. supraorbitalis with a. temporalis superficialis, a. vertebralis with a. cervicalis profunda, a. vertebralis with a. occipitalis;
A. dorsalis nasi with a. supraorbitalis, a. supraorbitalis with a. temporalis superficialis, a. vertebralis with a. occipitalis;
A. supraorbitalis with a. supratrochlearis, a. temporalis superficialis with a. occipitalis, a. dorsalis nasi with a. angularis;
A. vertebralis with a. temporalis superficialis, a. dorsalis nasi with a. angularis, a. supraorbitalis with a. supratrochlearis?

What anastomoses of retrocranial arteries are important in general blood circulation at ligation of common carotid artery:
A. thyreoidea superior with the artery of the same name on the opposite side, a. thyreoidea superior with a. thyreoidea inferior, a. occipitalis with a. cervicalis profunda;
A. thyreoidea superior with a. cervicalis profunda, a. facialis with a. temporalis superficialis, a. occipitalis with a. temporalis superficialis;
A. thyreoidea superior with a. thyreoidea inferior, a. facialis with a. temporalis superficialis, a. occipitalis with a. cervicalis profunda;
A. temporalis superficialis with the artery of the same name on the opposite side a. thyreoidea superior with a. thyreoidea inferior, a. facialis with a. occipitalis?

Identify skeletotopy of the pharynx:
From the base of the skull to the VI cervical vertebra;
From pars nasalis to pars laryngea;
From the IV cervical to the VII cervical vertebrae;
From the hard palate to the entrance of the larynx?

What is identified in frontr of the larynx:
Nasal cavity, oral cavity, pharynx;
Esophagus, thyroid gland;

Pharynx, thyroid gland;
Pharynx, thyroid gland, m. longus capitis?

What is identified behind the pharynx:
Bodies of cervical vertebrae, m. longus colli, fascia prevertebralis, retropharyngeal space;
Bodies of cervical vertebrae, pharynx, esophagus, m. longus colli, retropharyngeal space;
Bodies of cervical vertebrae, m. longus colli, ductus thoracicus, fascia prevertebralis;
Bodies of cervical vertebrae, m. longus colli, fascia prevertebralis, esophagus?

What is identified laterally from the pharynx:
Common carotid arteries, parts of the thyroid gland, a. pharyngea ascendens, v. jugularis interna, a. carotis interna, the IX-XII pairs of intracranial nerves, truncus sympathicus;
A. carotis interna, v. jugularis interna, the IX-XII pairs of intracranial nerves;
A. carotis communis, n. vagus, v. jugularis interna, parts of the thyroid gland;
A. carotis communis, n. vagus, v. jugularis interna, parts of the thyroid gland, n. laryngeus recurrens, a. pharyngea ascendens?

Identify the passage of inferior thyroid artery:
Behind a. carotis communis in front of a. vertebralis;
Upward to m. scalenus anterior;
Along the clavicle to incisura scapulae;
In transverse direction to scalene muscles?

Identify the topography of superior laryngeal nerve:
Comes from the medial side of a. carotis interna;
Passes in front of a. carotis interna;
Between trachea and esophagus;
Passes along the anterior surface of trachea?

Identify the passage and region of innervation of r. internus n. laryngeus superior:
Together with a. laryngea superior it penetrates through membrana thyreohyoidea, innervates mucous membrane of the pharynx above plica vocalis, root of the tongue and epiglottis;
Passes medially to a. carotis interna, innervates larynx;

Passes between trachea and esophagus, innervates pharynx above plica vocalis;
Together with a. laryngea superior it penetrates through membrana thyreohyoidea, innervates the mucous membrane of the pharynx below vocal fissure.

What incision is performed to expose thyroid gland at strumectomia:
Kocher's incision;
De Quervain's incision;
Petrovskyi incision;
Dyakonov's incision?

What is used for dissection of the second and third fascia of the neck at strumectomia:
Medianline of the neck;
Transverse incision above the jugular incisure of the breastbone;
Anterior margin of sternocleidomastoid muscle;
Petrovskyi incision?

Name the author of the subtotal subfascial resection of the thyroid gland:
Nikolaiev;
Kocher;
Martynov;
Rusanov?

What is the way of surgical intervention at nodular goiter:
Partial resection of the thyroid gland;
Subtotal subfascial resection of the gland;
Enucleation of the ganglion;
Total extirpation of the thyroid gland?

What symptoms can follow the removal of parathyroid glands:
Chvostek, Trousseau;
Moebius;
Schtelvag;
Gorner?

What should be necessary conducted in extreme situation at deep asphyxia:
Conicocentez;
Craniotomy;

Upper tracheotomy;
Tracheotomy of Bjork?

What incision is performed at coniotomy:
Transverse incision in the interspaces between cricoid and thyroid cartilages;
Vertical incision on Kocher median line;
Transverse incision above the jugular incisure of the breastbone?

What special instruments are used at tracheotomy:
Luer's cannula, one-tooth sharp Kocher retractors, Trousseau dilator;
Luer's cannula, raspator, laminar Langenbeck retractor;
Luer's cannula, laminar Farabeuf retractor, Trousseau dilator;
Luer's cannula, haemospinal forceps, one-tooth sharp retractors, Trousseau dilator?

Describe tracheotomy according to Bjork technique:
On the anterior wall of trachea the tongue–like flap with the turned up apex is cut out, ends of the flap are fixed to skin;
Incision is made on the medial line from cricoid cartilage to incisure of the breastbone cutting the II and III rings of trachea that are fixed to skin;
Transverse incision is made between cricoid and thyroid cartilages, borders of the wound of trachea should be fixed to skin;
Trachea is dissected between the II and III rings, borders of the wound of trachea should be fixed to skin?

What is identified externally from fascia pharyngobasilaris:
Muscle coat;
Mucous membrane;
Parapharyngeal cellular tissue;
Retropharyngeal space?

What is located externally from muscle coat of the pharynx:
Fascia buccopharyngea;
Fascia pharyngobasilaris;
Mucous membrane;
Parapharyngeal cellular tissue?

What is located externally from fascia buccopharyngea:
Parapharyngeal cellular tissue;
Muscle coat;

Mucous membrane;
Fascia pharyngobasilaris?

Blood supply of pharynx is carried out by:
A. pharyngea ascendens, a. palatina ascendens, a. palatina descendens, a. canalis pterygoideus, a. thyreoidea superior, a. thyreoidea inferior;
A. pharyngea ascendens, a. palatina ascendens, a. palatina descendens, a. thyreoidea superior et inferior, a. cervicalis ascendens;
A. pharyngea ascendens, a. palatina descendens, a. thyreoidea superior et inferior, a. cervicalis profunda;
A. pharyngea ascendens, a. palatina ascendens, a. palatina descendens, a. thyreoidea superior et inferior.

What is pharynx innervated by:
N. glossopharyngeus, n. vagus, truncus sympathicus;
N. glossopharyngeus, n. vagus, n. hypoglossus, truncus sympathicus;
N. glossopharyngeus, n. accessorius, n. vagus, truncus sympathicus;
N. glossopharyngeus, n. vagus, n. phrenicus, truncus sympathicus?

What incision is performed to expose the abscess of retropharyngeal space:
The vertical incision of the posterior wall of the pharynx 1 cm in depth, 2 cm in length through the oral cavity;
Arciform incision in the region of angle of the mandible;
Incision is performed on the anterior margin of sternocleidomastoid muscle;
Kocher's incision?

Blood supply of the cervical part of esophagus is carried out by:
A. thyreoidea inferior;
A. thyreoidea superior;
A. pharyngea ascendens;
A. cervicalis profunda.

What should be necessary conducted before finishing the suture of arthrotomic aperture at carotid thrombus endarterectomy:
To clean thrombs, remove air;
To remove plague from the air gap of artery;
Exfoliate and remove plague from the air gap of artery;
Balloon angioplasty?

What is the first stage of thrombus endarterectomy operation:
Exfoliation of plague from arteries;
Cleaning up thrombs;
Removing air;
Exfoliation of plagues and remove thrombs?

How are the thrombs removed at thrombus endarterectomy operation:
Through staged making of blood empty;
Giving heparin;
Through balloon angioplasty;
Through plexectomy?

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