

Lecture №3. METHODS OF RESEARCH OF THE PATIENT. PALPATION. GENERAL PRINCIPLES, METHODS. PALPATION OF THE THORAX, HEART, ABDOMEN, LIVER, SPLEEN, KIDNEY, LYMPH NODES, THYROID GLAND.

Palpation (lat. palpatio - feeling) is a clinical method of direct examination of a patient with the help of touch to study the physical properties of tissues and organs, the topographical relationships between them, and their soreness.

This method of research has been known since Hippocrates, but until the XIX century, the use of palpation was limited to the study of the condition of the skin, joints, bones and the properties of the pulse. From the middle of the XIX century, clinical practice included the study of vocal tremor and apical heart beat (Laennek, Piorri, Skoda). Systematic palpation of the abdominal cavity became possible only from the end of the last century and the beginning of this century after the publication of the works of S.Botkin, F. Glenar, V.Obraztsova and N.Strazhesko. Further development of palpation of the abdominal cavity led to the creation of a harmonious theory of deep, sliding, topographical, methodological palpation.

The physiological basis of palpation is the sense of touch. If the density of the palpable organ is greater than the density of the medium, a tactile sensation arises when one probes an organ through an intermediate medium. It appears when the consistency of the tissues under the fingers changes or when the movement is blocked. It is necessary to press the organ under examination to a dense basis (the pelvic bone, the palm of the doctor's palm resting under the waist of the patient) to palpate a relatively soft body (gut).

General rules of palpation. You must strictly follow certain rules to palpate. The doctor's hands should be warm (the cold causes a reflex contraction of the muscles), dry, with cropped nails, hand movements should be smooth, any increase in pressure should be gradual. Palpation can be performed if a patient is in supine position, side lying and in an upright position.

There are two types of palpation, depending on the objectives: superficial and deep palpation.

Superficial palpation of the skin, joints, chest, abdomen is used as a general, pilot study.

Deep palpation serves for a more detailed study of the organ. The deepest, sliding methodical palpation of the abdomen is most fully developed.

A kind of deep palpation is the *penetrating palpation* to determine the soreness in certain points of the abdomen. Pressing one finger should be perpendicular to the abdominal wall. The most commonly explored is the appendix of McBurney (on the border of the lower and middle third of the line connecting the navel with the iliac bone), the bubble point (at the point of intersection of the outer edge of the rectus abdominis and the right costal arch) and the pyloroduodenal point (located on two transverse fingers to the right and up from the navel).

Balloting palpation determines the balloting of dense bodies in the abdominal cavity with accumulation of fluid in the abdominal cavity, patella in the swelling of the knee joint.

Sliding palpation according to V. Obratsov is used to study the organs of the abdominal cavity.

Palpation of lymph nodes

Great importance for the diagnosis of certain diseases of internal organs (diseases of the blood system, malignant neoplasms, tuberculosis, infectious and inflammatory diseases) is the study of peripheral lymph nodes in the subcutaneous tissue.

Lymph nodes provide barrier-filtration and immune function. The flowing lymph through the sinuses of the lymph nodes is filtered through the loops of the reticular tissue. Small foreign particles trapped in the lymphatic system from the tissues (microbial bodies, tumor cells, etc.) are held, and lymphocytes formed in the lymphoid tissue of the lymph nodes enter the lymph. Lymph nodes during the examination are detected only with a sharp increase or significant weight loss of the patient. Their primary examination is palpation.

Palpation of the lymph nodes is performed with the examination and makes it possible to determine the degree of increase, consistency, soreness, mobility and adhesion to the skin.

Peripheral lymph nodes are round or oval formations from 5 to 20 mm in size in health. They do not protrude above the level of the skin and therefore are not detected during examination. However, some of the lymph nodes can be palpated even in a healthy person (submaxillary, axillary, inguinal). They are relatively small in size, of a soft consistency, painless, moderately mobile and not soldered to each other and to the skin. There is an opinion that lymph nodes that are palpable in a healthy person are a consequence of local inflammatory processes that have been before.

The method of palpation is that you can palpate lymph nodes, from top to bottom, starting with the head. Palpate the areas of occlusion of the occipital, parotid, submandibular, sublingual, chin, posterior cervical, anterior cervical, supraclavicular, subclavian, axillary, ulnar, inguinal, popliteal lymph nodes. Palpation of lymph nodes is performed with both hands on symmetrical points.

Palpate the lymph nodes with the tips of the fingers, making sliding circular motions in the area of the supposed localizations of this group of lymph nodes and, if possible, pressing them to denser formations (bones, muscles). First, extend the patient's arm sideward and bent fingers of the investigator in the axillary region to palpate axillary lymph nodes. Second, put the patient's hand to the chest and with one sliding movement of the hand from the top down try to probe the lymph nodes.

The main groups of lymph nodes which should be palpated:

- 1) submandibular.
- 2) cervical (anterior, posterior)
- 3) supraclavicular
- 4) subclavicular
- 5) axillary.
- 6) inguinal lymph node.

Palpating lymph nodes pay attention to:

- size,
- shape,
- consistence,
- soreness,
- mobility, adhesions between themselves and surrounding tissues,
- skin condition above the lymph nodes.

In practice a doctor can face two kinds of changes in lymph nodes:

- 1) *a spreading, systemic lesion* of the lymph nodes, which can be caused by both inflammatory changes (for example, certain infections - syphilis, tuberculosis, tularemia), and changes associated with tumor growth in certain blood diseases (leukemia, lymphosarcoma, lymphogranulomatosis).

Generalized enlargement:

- Sarcoidosis
 - Syphilis
 - Tbs
 - Mononucleosis
 - Lymphoid leukaemia
 - Lymphogranulomatosis
 - Lymphosarcoma
 - Systemic connective tissue diseases
- 2) *local increase* of regional lymph nodes as inflammatory (local purulent processes) and neoplastic (cancer metastases).

Local enlargement of lymph nodes:

Cervical lymph nodes :

- Tonsillitis.
- Pharyngitis.
- Scarletina (scarlet fever)

- Diphtheria
- Lymphangioma
- Tumour of thyroid gland

Submandibular :

- Caries.
- Gingivitis.
- Tumour of larynx.
- Carcinoma of lips.

Supraclavicular :

- Tumour of mammary gland
- Tumour of gastric (virchovis metastasis)-

Inguinal

- Paronychia, paraitium.
- Blister foot
- Syphilis
- Gonorrhoea
- Bartholinitis

Subclavicular

- Tumour of thyroid gland
- Tumour of the lung

Axillary

- Furunculosis
- Paronychia
- Pararitium (felon, whitlow)
- Tumour of mammary gland
- Tumour of lung

In order to correctly explain the local enlargement of the lymph nodes it is necessary to represent the typical pathways of the lymph drainage from different areas of the body.

Lymph nodes of the lower jaw, sublingual and submandibular lymph nodes increase because of local pathological processes (stomatitis, gingivitis, glossitis, cancer) in the tonsils, oral cavity. *Parotid and bovine* lymph nodes increase because of lesions of the outer and middle ear. *Nuchal* lymph nodes increase because of pathological processes in the scalp and on the neck. *Cervical* lymph nodes increase because of lesions of larynx and thyroid gland (cancer, thyroiditis). *Supraclavicular lymph nodes on the left* increase because of metastases of stomach cancer (Virchova iron), etc. The most typical pathways of the lymph drainage are in the region of the

upper humeral girdle. *The ulnar lymph nodes* collect lymph from the III, IV and V fingers of the hand, they are affected by the suppuration of the upper limbs. Axillary lymph nodes collect lymph from the I, II and III fingers, as well as from the area of the breast, they are affected by cancer, mastitis. Inflammatory or neoplastic lesions of the mammary glands are often accompanied by an increase in axillary, subclavian, supraclavicular and parasternal lymph nodes.

Particular diagnostic significance is the metastasis of lung cancer in the axillary lymph nodes. In inflammatory lesions of this localization, subclavian, and even supraclavicular lymph nodes may be involved in the pathological process.

Inguinal lymph nodes collect lymph from the genital organs and pelvic organs, as well as from the tissues of the lower extremities, popliteal lymph nodes mainly from the posterior shins.

Remember: lymph nodes in acute lymphadenitis are always painful, slightly densified, mobile, not united with surrounding tissues.

Sometimes, especially with purulent necrotic processes in the skin and suppuration of wounds, between the area of inflammation and swollen lymph nodes you can notice a reddish trace caused by inflammation of the corresponding lymphatic vessels (lymphangitis), the skin above the lymph node can be hyperemic.

In systemic lesions, lymph nodes are usually painless, dense, with an uneven surface. They can reach large sizes (with lymphogranulomatosis up to 15-20 cm). In association with tuberculosis, lymphosarcoma, the lymph nodes coalesce, form conglomerates, become inactive, and inflamed.

In the differential diagnosis of diseases accompanied by enlarged lymph nodes, the following factors can help (Madyar, 1987).

Large lymph nodes: lymphocytic leukemia, lymphogranulomatosis, lymphosarcoma, lymphoma. *Fast enlargement of lymph nodes:* mononucleosis, rubella, disease from cat scratches, other acute infections, nonspecific lymphadenitis.

Very dense lymph nodes: tumor metastasis, sometimes tuberculous lymphadenitis.

Lymph nodes coalesced to the skin: actinomycosis, tuberculosis, purulent lymphadenitis.

Suppuration of the lymph node: tuberculosis, actinomycosis, rarely - tumors.

Enlargement of lymph nodes accompanied by fever: acute lymphadenitis, mononucleosis, rubella, lymphogranulomatosis, reticulosis.

Enlargement of lymph glands accompanied by enlarged spleen: lymphogranulomatosis, leukemia, lymphosarcoma, disseminated lupus erythematosus, sarcoidosis.

Mediastinal tumor: lipogranulomatosis, mononucleosis, leukemia, sarcoidosis.

Changes in bones: malignant tumors, eosinophilic granuloma, lymphogranulomatosis, Ewing's sarcoma, reticulosis, sarcoidosis.

Palpation of the thyroid gland

The doctor should be in front of the patient. Before palpation examine the area of the thyroid gland, in order to detect visible of its enlargement. First, the isthmus of the thyroid gland is palpated with the thumbs of the right hand from top to bottom, then lateral lobes, penetrating the inner edges of the sternocleidomastoid muscles.

You can ask the patient to swallow, which makes palpation better.

Palpation of the thyroid gland can be done with the bent fingers of both hands (2 and 3 fingers) penetrating the inner edges of the sternocleidomastoid muscles, and reach the posterior-lateral surface of the lateral lobes of the gland. In this case, the doctor should be behind the patient.

The following signs are determined by palpation:

- position,
- dimensions (the degree of enlargement of the thyroid gland),
- Consistency (presence or absence of nodes), - soreness,
- Dislocation.

Healthy person's thyroid gland is not enlarged by palpation, elastic, painless, flexible.

During palpation *diffuse enlargement* of the thyroid gland is determined as smooth surface of a soft consistency. With the nodular goiter, a knotty dense formation in the thyroid gland is determined. With acute and subacute thyroiditis, the thyroid gland is enlarged and painful. In malignant lesions, the thyroid gland becomes dense and may lose mobility.

The stages of enlargement of the thyroid gland:

I stage - the isthmus of the thyroid gland is enlarged, which is clearly palpable and visible upon swallowing

II stage - well defined lobes of the gland and isthmus both in palpation and in swallowing

III stage - the thyroid gland fills the front surface of the neck, smoothers out its contours and is visible on examination (short neck).

IV stage - the shape of the neck is dramatically altered, the enlarged thyroid gland appears as tumor

V stage - thyroid gland is very large.

But at the same time palpation is not a reliable method of determining the size of the thyroid gland and about 30-40% gives an erroneous result.

Clinical classification of goitre size (World Health Organization, 1995):

0 – no goiter.

1 – the size of the lobes is greater than the distal phalanx of the thumb, the goiter is palpable but not visible

2 – the goiter is palpable, but not visible

The results of the gland palpation are affected by:

- the size of the goiter (the smaller the goiter, the lower the informative value of the palpation);

- the age of the examined person (for example, the younger the child, the more difficult the palpation of the thyroid gland and the less reliable the results of the examination);

- short neck, powerful muscles and thick subcutaneous fat layer;

- an unusual location of the thyroid gland (sometimes an enlarged thyroid gland may descend partially or completely beyond the breastbone, in this case, goiter is called retrosternal, in rare cases the thyroid gland may be located near the root of the tongue);

- difficulty in comparing the size of the palpable thyroid gland with the phalanx of the finger.

Palpation of muscles, bones and joints

Palpation of muscles, bones and joints is used in performing the examination.

Muscles.

The examination of muscles evaluates:

- degree of muscular development,

- tonus,

- strength,

- muscle soreness on palpation.

Degree of muscular development (hypertrophy or atrophy of individual muscles or muscle groups) is detected by measuring its circumference and comparing them with the same symmetrical place data (for example, measure the circumference of a modified and healthy limb).

Atrophy of muscles can be related to the muscle disorder, its innervation, and other causes. Muscle atrophy often occurs in weakened patients, suffering from certain diseases of the nervous system, accompanied by paralysis or paresis of the limbs, and also with chronic joint damage (see below).

The definition of muscle strength and the detection of muscle function disorders plays the diagnostic role.

During the study of muscles, it is also important to define involuntary muscle contractions - *convulsions*. There are convulsions:

- *tetanic convulsions* - relatively long (from several minutes to several hours) convulsive muscle contractions (meningitis, rabies, tetanus);

- *clonic convulsions* - quickly following one after another convulsive contractions of muscles (for example, with epileptic seizures).

Convulsions can develop with kidney disease (eclampsia), liver (liver failure), disorder of central nervous system (meningitis), tetanus, cholera, etc.

Muscle soreness occurs in myositis, sprains and bruises, intercostal neuralgia.

Osteoarticular system

Bones. Determine the shape of bones, the presence of deformities, soreness in palpation and percussion.

There are deformations of the spine most often among pathological deformations of the bones. There are deformations of the spine:

1) *kyphosis* - curvature of the spine convex back, often with a hump (gibbus);

2) *lordosis* - curvature of the spine by convex forward;

3) *scoliosis* - lateral curvature of the spine.

Quite often there is a combination of kyphosis and scoliosis (kyphoscoliosis).

Patients with *Marie-Striipell disease* (Bekhterev's disease) have a combination of hyperlordosis of the cervical and kyphosis of the thoracic spine, which leads to very characteristic changes such as a petitioner's posture.

Remember: Excessive curvatures of the spine often lead to significant disorder of lungs and heart, in particular, to the development of respiratory failure and pulmonary heart.

Excessive proliferation of peripheral bones of the extremities (fingers, legs), malar bones, lower jaw, etc. occurs with *acromegaly*.

Rachitic changes - the so-called chicken breast, rachitic rosary - thickening in the areas of transition of the part of the bone into cartilaginous part from the ribs, curvature of the lower extremities, etc. Significant deformations of the spine (kyphosis, scoliosis) can affect negatively on the functions of the chest organs.

With certain *diseases of the blood system* (leukemia, myeloma, B12-deficiency anemia), it is important to determine soreness of the bones by percussion, as well as the presence of *pathological bone fractures*.

Joints. Physical examination of joints is determined:

-configuration,

-swelling,

- soreness on examination and movements,
- range of active and passive motions in joints,
- changes of the skin and subcutaneous tissue in the joint area.

The examination of the locomotor system must necessarily be preceded by a study of the general state of the patient. Pay attention to its constitutional type: for example, people with hypersthenic physique are more likely to have dystrophic joint diseases. The signs of endocrine diseases may indicate the possibility of various endocrine arthropathies. Pay attention to the state of the skin, for example, peeling, hyperpigmentation is characteristic for rheumatoid arthritis, plaque affects extensor surfaces like elbows, knee joints, scalp for psoriatic lesions.

Joint configuration. Changes in the configuration of joints can be due to various reasons. In inflammatory diseases of the joints (arthritis), as a rule, joint range of motion, contour smoothing of the joints, and their swelling. This joint configuration associated with acute inflammatory edema of the synovium and soft tissues surrounding the joint (periartikulyarny edema), as well as the presence of effusion in the joint cavity. Often in these cases, the skin over the area of the affected joint is hyperemic, its temperature is increased. Usually, these changes in the shape of the joints disappear without a trace with effective anti-inflammatory treatment on time.

Joint deformation is a more stable change in joint shape due to destruction of cartilage and articular ends of bones, development of ankylosis, bone proliferation, damage to the musculoskeletal system and subluxation of the joints. Many diseases are manifested by characteristic deformations of the joints. So, with rheumatoid arthritis, hands are like walrus fin. There is a characteristic ulnar deviation of the hand - the deviation of the III, IV and V fingers in the direction of the ulna caused by subluxations in the metacarpophalangeal joints with the protrusion of the metacarpal heads, and also the radial deviation of the wrist joint.

Deforming osteoarthritis is determined subluxation of metacarpophalangeal joints and lateral deviation (radial or ulnar) of distal interphalangeal joints, dense nodules in the rear and side sections of distal interphalangeal joints (Heberden's nodules) and proximal interphalangeal joints (Bushar's nodules) caused by osteophytes.

In patients with advanced osteoarthrosis, when studying in an upright position (weight load), specific deformations of the knee joints are often detected. Varus deformity of knee joints - genu varus, or bow legs, - indicates a primary lesion of the medial joints (loss of cartilage).

Valgus deformity of the knee joint - genu valgus, X-shaped legs, is associated with cartilage damage in all parts of the knee joint.

It is often possible to determine other deformities caused by the damage to periarticular tissues in joints. A typical example of persistent deformation and limitation of mobility of joints

due to lesions of periarticular tissues is Dupuytren's contracture. This is a chronic inflammatory disease of the palmar aponeurosis and tendons of the IV and V fingers of the hand, leading to scarring, tightening of the skin and fixed flexion contracture in the metacarpophalangeal and proximal interphalangeal joints.

Local swelling around the elevation of the ulnar process occurs with bursitis - local inflammation of the serous bag of the elbow joint.

Limited swelling of the testate consistency, located on the rear of the hand near the wrist joint, caused by inflammation of the synovium (tenosynovitis) of the common extensor of the fingers.

Patients with gout are characterized by the deposition of urate crystals under the skin with the formation of dense gouty nodes (tofus), they are in elbows, knee joints and around the interphalangeal and metacarpophalangeal joints of the hand, can create the impression of their sharp deformation. Very characteristic of gout is the appearance of tofi on the auricles.

Subcutaneous rheumatoid nodules, which are dense, round, painless connective tissue lesions, which are more often localized on the extensor side of the forearm near the elbow joint. Rheumatoid nodules are a characteristic feature of rheumatoid arthritis.

Skin changes over the affected joints are more often in hyperemia and hyperthermia, which indicates an acute inflammatory process in the joint and periarticular tissues. The skin temperature in the joint area is better evaluated by applying the back surface of the patient's hand, and for a very short time (no more than 0.5 - 1.0 s), because a longer touch can equalize the skin temperature of the patient and the investigator.

Mobility and soreness of the joints. Determine the amount of *active and passive movements in the joints*. Active movement is performed by the patient himself. Passive movements in the joints under investigation are performed by the doctor with complete muscle relaxation of the patient.

Regardless of the lesion of the joint or periarticular tissues, the volume of active movements in most cases is reduced. In order to assess the degree of limitation of joint movements, focus on some indicators of normal motor function.

In the study of joints, it is important to decide the nature of the damage to the joints themselves and periarticular tissues (muscles, tendons, nerves, etc.). In this case, the following methods are helpful:

Determination of *soreness of joints* during palpation. Soreness is defined in the joint fissure, in most cases indicates a lesion of the joint or the presence of intra-articular pathology (for example, rupture of the knee joint meniscus). Soreness, limited by periarticular points, is usually associated with extraarticular pathology (for example, with the development of bursitis).

Determination of the pain nature occurs during movement of the joints. Inflammation of the synovial membrane of the joint is characterized by the appearance of so-called stress pain during movements (minor pain with medium amplitude movements, which is sharply increased at extreme points of flexion and extension.) Pain of equal intensity throughout the movement is more often associated with mechanical changes in the joint (cartilage destruction or bones).

Determination of soreness in resistive active (isometric) movements in joints is an important symptom of damage to periarticular tissues. There is the following study. The doctor tries to make movement in the joint (red arrows), and the patient at the same time has active resistance to this movement, straining the corresponding muscles (blue arrows).

Remember: if there is pain in the resistive active (isometric) movements in the joints, and there are no movements in the joint, it is about the damage to the muscles, tendons and other periarticular tissues, but not the joint itself.

Range determination of active and passive movements. In most cases, with inflammation of the synovial membrane, the same restriction is observed for both active and passive movements in the joints. Remember: if the range of passive movements exceeds the range of active movements, this indicates a concomitant lesion of periarticular tissues.

Determination of crepitation (crunching) during movements. Crepitation is determined palpably throughout the bending or extension of the affected joint. Light, barely noticeable crepitus usually indicates inflammation of the synovial membrane, bag or tendon sheath. Rough crepitation indicates the damage to cartilage or bone. You should distinguish crepitus from loud single tendon clicks that sometimes appear when moving in large joints (humerus, knee, hip, etc.), and clicks associated with artificial extension of joints, for example, the joints of the fingers. In the latter case, clicks are more often caused by the formation of intra-articular gas bubbles.

It is also important to assess the state of the muscles in the joint area. The weakness of the muscles attached to them and their atrophy are characteristic for joint lesions.

Palpation of the chest

Palpation of the chest can reveal soreness (local or diffuse), assess elasticity (resistance), voice trembling, catch the noise of friction of the pleura.

1. Soreness of the chest is determined by superficial palpation. Bent fingers of both hands, slightly pressing, palpable ribs and intercostal spaces in the symmetrical areas of the chest. First, palpation is carried out on the front surface of the chest, beginning with supraclavicular pits, and then on the back surface, starting from the suprascapular region.

Palpation allows you to establish the localization of *superficial pain* and how it spreads. Soreness when pressing between the legs of the sternocleidomastoid muscle at the site of the

projection of the diaphragmatic nerve (the point of Georgievsky-Musset) is revealed with diaphragmatic pleurisy, with diseases of the liver, biliary tract, peritoneum, perigastrites due to the involvement of the muscle in the chest muscle. Soreness at the George's-Musset point on the left may appear with coronary heart disease. Inflammation of the intercostal nerves and muscles gives pain throughout the intercostal space, which increases when bent to the sore side. When the ribs are broken, the pain is in a limited area (at the site of the fracture). Soreness with pressure on the ribs and sternum can occur with the hyperplastic processes of the bone marrow - myeloma, myeloid.

At palpation it is possible to reveal deep (pleural) soreness. *Pleural (deep) pain* is rarely detected palpation. The pains of pleural origin do not have a clear localization (pain deep inside the chest) and intensify when the body bends to a healthy side, decrease if the chest is squeezed from the sides with the hands (Yanovski's symptom).

2. The elasticity of the thorax is examined with both hands, placing palms on the investigated areas symmetrically and as if embracing it from two opposite sides in the anteroposterior ("sternum-spine") and lateral directions. Normally, this manipulation gives a sense of elasticity.

With such pathological states as exudative pleurisy, pulmonary consolidation, pleural tumor, there is a feeling of increased density on the side of the lesion (*unilateral rigidity*).

Reduced elasticity of the whole thorax is observed with emphysema (excessive airiness of the lungs) and in the elderly due to ossification of cartilage or bilateral hydrothorax.

3. Voice tremor is a sensation of chest vibration on the patient's chest, with a loud low voice of the pronouncing word with the sound "r" (for example: "thirty-three", "broom, tree, rabbit"). The vibration of the vocal cords is transferred to the chest by air in the trachea, bronchi and alveoli. For the examination of voice trembling, it is necessary that the **bronchi** are **crossable**, and the **lung tissue adheres to the chest wall**. The determination of voice tremor is made with both hands simultaneously in strictly symmetrical points. In a healthy person, the vibration of the chest in symmetrical areas is equally, in the lower sections is weaker, in the upper ones is louder. Voice tremor is better performed in men with low voice and in people with a thin chest, weaker - in women and children with high voice and in people with hypersthenic physique.

Increased voice tremor occurs when a large area of lung tissue becomes dense and airless from the root of the lung to the chest, if the bronchi are crossable. This is observed in compressed lung tissue (croup pneumonia, infiltrative tuberculosis, lung infarction), over caverns and abscesses, which create resonance of sound and are usually surrounded by an inflammatory infiltration zone, compression atelectasis over the collapsed lung tissue.

Attenuation of voice tremor is observed with partial obstruction of the lumen of the bronchus with a tumor or foreign body (sound vibrations are extinguished on the obstacle), when fluid (hydrothorax) or air (pneumothorax) accumulates in the pleural cavity, which separate the lung from the chest wall and extinguish sound vibrations, in weakened patients (due to a weakening of the voice).

Absence of voice tremor occurs with complete obturation of the lumen of the bronchus, excessive hydrothorax or pneumothorax.

4. Palpation is sometimes possible to determine the *noise of friction of the pleura* (with abundant coarse deposits of fibrin), *dry buzzing rales* in bronchitis and a *peculiar crepitus with subcutaneous emphysema*.

Palpation of the cardiovascular system

Palpation of the cardiovascular system has got a diagnostic significance, because it allows to identify a number of diagnostic criteria that characterize the heart and blood vessels.

1. Palpation of the heart area. When you palpate the area of the heart, determine the apical impulse and other pulsations.

Palpation of apical impulse (apical beat). The apical impulse is a result of the contraction of the heart muscle, it becomes denser and in its movement from behind in front and from left to right, the apex hits the anterior thoracic wall. Palpated apical impulse in about 50% of healthy people. In order to determine the apical impulse, the palm of the right hand with the withdrawn thumb is laid horizontally under the left nipple, the base of the wrist to the sternum, and the fingers to the armpit. Then the 2nd and 3rd fingers, located perpendicular to the surface of the chest, specify the localization, area, force and height of the shock, moving the fingers along the intercostal space towards the sternum. When determining the apical impulse in women, it is necessary that the patient with the right hand lifts the left breast gland.

The *localization of the apical impulse* is normal in the standing position - the 5th intercostal space is 1-1.5 cm inward from the left midclavicular line. In a healthy person, the heart can move depending on the position of the body, the physique. For example, in the position on the left side, the apical impulse is shifted to the left, and on the right side to the right. In the hypersthenic, due to the high-standing diaphragm, the heart has a horizontal position, so the apical impulse is shifted to the left, and for the asthenics - to the right.

In case of the displaced apical impulse, not related to a change in the position of the body or the physique, we can talk about the diagnostic sign of changes in the heart.

The *displaced apical impulse* to the left is observed with the expansion (hypertrophy) of the left ventricle (heart defects, arterial hypertension, ischemic heart disease, etc.), and the degree of displacement depends on the severity of hypertrophy. For example, with aortic defects, the apical impulse can be shifted to the anterior axillary line and fall into the sixth or seventh intercostal space. And with stenosis of the left atrioventricular orifice, the apical impulse is not displaced.

In addition, *the apical impulse may shift in diseases of other organs*. For example, with ascites, pregnancy, a significant increase in the liver and spleen, significant flatulence due to increased pressure in the abdominal cavity apical impulse shifts to the left. With a low diaphragm standing (after birth, with weight loss, visceroptosis), the apical impulse shifts to the right.

The accumulation of liquid or air in the pleural cavity leads to displaced heart and apical impulse in the healthy side, and pleuropericardial adhesions and lung atelectasis in the unhealthy side.

The area of apical impulse is normally not more than 2 cm². It becomes diffuse during dilatation of the left ventricle. The apical impulse is not determined if it is in the rib, as well as with pulmonary emphysema and exudative left-sided pleurisy.

The height (amplitude) of the apical impulse is determined by the swing of the thoracic wall frictions in the area of the beat. It is proportional to the magnitude of cardiac output.

The strength of the apical beat is determined by the pressure it exerts on the palpating fingers. Increasing apical beat can be observed with hyperexcitability (stress, thyrotoxicosis). With hypertrophy of the left ventricle, a strong (resistant) apical impulse is determined. The significant increase of the apical impulse is determined when the aortic valves are inadequate uplifting, dome-shaped apical impulse.

Data of palpation of the apical beat in the normal:

1. Localization of apical beat - Topographical location of the heart apex relative to anatomical landmarks - 0,5-1 cm on the right of the midclavicular line in normal 5 th intercostal space
2. Prevalence - width (square) of beat in normal 2 cm in diameter
3. Altitude - distance to which intercostal space rises during systole in normal conditions is low
4. Resistance - power of the heart muscle during systole in normal is moderate

Other pulsations in the heart area

There is no *substernal pulsation* in healthy people. If it exists, there is a ***cardiac beat***. It is caused by severe contractions of the heart, more often the right ventricle, because it is directly attached to the anterior thoracic cage.

Pulsation in the jugular fossa is determined with *aortic aneurysm, insufficiency of the semilunar aortic valve*. It is necessary to have II-III fingers of the right manubrium for the handle of the sternum in the area of the jugular fossa. The head of the patient should be bent, and the shoulder girdle lifted.

Epigastric pulsation is a visible pulsation in the epigastric region, synchronous with the activity of the heart. Epigastric pulsation may depend on right ventricular hypertrophy, abdominal wall abdominal wall fluctuations, and liver pulsations. With *hypertrophy of the right ventricle*, it is localized under the xiphoid process and becomes more distinct with deep inhale.

With an *aneurysm of the abdominal aorta*, pulsation appears lower and is directed back to front. Pulsation of the abdominal aorta can be determined in healthy people with a thin abdominal wall.

The pulsation of the liver, felt in the epigastrium, is transmissible and true. Transmitted pulsation of the liver is caused by contractions of the hypertrophic right ventricle. True liver pulsation is observed in patients with tricuspid valve deficiency, when there is a reverse flow of blood from the right atrium to the inferior vena cava and the vein of the liver (a positive vein pulse). In this case, every contraction of the heart causes swelling.

In the heart area, it's possible to palpate a vibratory murmur, that feels like "cat's purr." "Cat's purr" occurs as a result of turbulent blood flow through the narrowed orifice of the valve and **cardiac concussion**. In order to detect it, you need to put your palm on your sternum, better in the position of the chest on exhalation. Distinguish between presystolic and systolic accentuation. Diastolic (or presystolic) is defined in the lower third of the sternum with stenosis of the mitral orifice. Systolic accentuation is determined in the upper third of the sternum at the bottom of the heart with stenosis of the aortic estuary.

Sequence of Actions in the Precordial Area Palpation and Examination:

1. Examination of heart region: pay attention in the presence of explosion in a heart region, pulsations, expansion of skinning veins. Define what places (on intercostals spaces and lines) the places of pulsations are present. Then it is necessary to synchronize them with a cardiac beat, for determination of which inspection is needed to add the palpation. For this purpose attach a right hand palm on the breast of patient in the area of apex of heart (that hands must be between parasternal and axillaries anterior lines and occupied the area – limited from above by the IIIrd rib and from below IVs rib). Farther with finger-pad of distal phalanx of index finger setting her strictly athwart find a lowermost and most lateral point, taking her for the place of cardiac beat.
2. Learn properties of cardiac beat: localization, width, height, resistance. It is needed to remember about possibility of negative cardiac beat, when during the systole of ventricles there is no

explosion of pectoral wall, and retraction her (this sign characteristic at adhesion of both layer of pericardium between itself and external layer of him with a pectoral wall).

3. At presence of visible filing pulsations on the separated areas of heart region begin their study:

a) define their localization; whether it belong to location of dissecting aneurysm of aorta, pulmonary artery, atriums, epigastria or livers;

b) for differentiation of pulsations of right ventricle from the pulsations of abdominal aorta it is possible to use a few signs: the pulsation of right ventricle is visible directly under the xiphoid process, and abdominal aorta a few lower, greater noticeable retraction, than explosion of epigastric area, at deep breath pulsation of right ventricle becomes more present (a diaphragm goes down, and

with it and right ventricle too). At palpation of liver it is needed to remember about 2 it variety: true (systolic), which appears in the intermittent swelling and diminishments at enlargement liver which is at insufficiency of tricuspid valve and "transmission" - from an abdominal aorta.

2. Palpation of vessels

Pulse palpation. Parameters of the arterial pulse can be determined only by palpation. In this case, the pulse is the rhythmic dilation of the artery into the systole of the ventricles of the heart, which is delayed relative to the I heart tone (systole). For a distinct palpation of the pulse, it is necessary that the artery lie superficially above the firm surface (bone), palpation should be available over a considerable length of the artery. All these conditions are corresponded the radial, temporal arteries and arteries of the rear of the foot.

In order to begin palpation, it is necessary simultaneously on both hands to determine the uniformity of the pulse. Then the doctor, being to the right of the patient, with the right hand should take the patient's hand in such a way that the 2- 3- 4th fingers are in the area of the lower part of the radial artery, and the thumb on the opposite side supports the hand. The patient's hand should be at the level of the heart. If the dilation of the pulse is greater on the left arm, then the left radial artery is palpated.

Determine the following properties of the pulse:

- 1) heart rate;
- 2) pulse rhythm;
- 3) full pulse;
- 4) heart tension;
- 5) pulse uniformity on both hands;
- 6) the state of the vascular wall outside the pulse wave.

Heart rate. Normally, the pulse rate is *60 to 90 beats per minute*. The pulse should be counted for one minute, but with the right rhythm, the pulse oscillations can be counted for 15-30 seconds, then multiply, respectively, by 4-2. The pulse rate depends on the phases of breathing - on the inhalation the pulse becomes faster, on exhalation - it becomes smaller. The frequency of the pulse rate depends on the strength and training of the heart muscle. In athletes, the pulse may be less frequent than normal - 40-50 beats per minute. During the sleep the pulse becomes more rare. Increased excitability of the central nervous system and physical activity contribute to the increase in heart rate. Children have much faster heart rate than adults.

Changing pulse frequency can be a consequence of pathological processes.

The pulse rate of more than 90 per 1 minute (pulsus frequens) corresponds to rapid heart rate (tachycardia). This is a consequence of vascular and cardiac failure (as a compensatory mechanism in order to decrease myocardial contractility), fever, increased sympathy tone, anemia, etc.

Reduction of the pulse rate (pulsus rarus), less than 60 beats per minute, occurs with stenosis of the aortic aorta, damage to the conduction system of the heart (complete atrioventricular block).

Pulse rhythm. This characteristic of the pulse depends on the rhythm of the heart. The pulse in a healthy person is *normal* or *rhythmic* (pulsus regularis). In pathology, the pulse may be irregular or arrhythmic (pulsus irregularis), then the intervals between the pulse waves are not the same. Various types of arrhythmias are known. The pulse can be used to define respiratory arrhythmia (rapid heart rate and inspiratory loss), extrasystole (extraordinary shortening), paroxysmal tachycardia (sudden increase in heart rate more than 150 per minute), atrial fibrillation (disordered pulse), atrioventricular blockade (pulse reduction to 18- 30 per minute) and other types of heart rhythm disturbances.

The *pulse tension* is determined by the level of arterial pressure and is characterized by the effort necessary to clamp the artery. In order to do this, the proximal finger should clamp the radial artery. The termination of pulsation is determined by the middle finger. In healthy people, the pulse is *not tensed*. With low blood pressure, a significant decrease in the contractility of the myocardium, the pulse can be *soft* (pulsus mollis), with high arterial pressure, and atherosclerosis can be *hard* (pulsus durus).

Full pulse. Fullness is determined by the number of fluctuations of the palpable artery during its filling and depends on the stroke volume of the left ventricle. In order to determine this property of the pulse, it is necessary to clamp the radial artery by the proximal finger (until the pulse wave disappears), then stop the pressure and estimate the amplitude of the appearing pulse wave. Normal pulse is determined by *satisfactory fullness*. With a large cardiac output, there is a

full pulse (pulsus plenus), for example, if the aortic valve is insufficient. Small in full pulse, called *weak* or *empty (pulsus inanis, vacuus)*, is caused by low cardiac output, which indicates significant myocardial damage. Hardly a palpable pulse is called *filiform (pulsus filiformis)* and is often observed in acute vascular insufficiency (syncope, collapse, shock).

At the atrial fibrillation, which is characterized by the absence of an atrial systole and various diastolic fullness of the indistinctly contracting ventricles, successive pulse waves are unequal in fullness. The weakest ones do not reach the radial artery, so that the pulse rate is less than the heart rate. This difference is called *pulse deficit (pulsus deficiens)*. In order to determine the pulse deficit, it is necessary synchronously in 1 minute to calculate the heart rate and the number of pulse waves on the radial artery (2 people evaluate). The difference between them is a pulse deficit. The deficit itself is calculated, when one surveyed determine the deficit.

Pulse uniformity. Comparison of the pulse fullness on the right and left radial arteries is performed simultaneously with two hands. In norm it is equal (*pulsus aequalis*). Pulse may be *different (pulsus differens)* due to anomalies of development, obliteration or traumatic damage of large vessels from aorta. With stenosis of the left atrio-ventricular aperture, the amplitude of pulse waves on the left radial artery is less, due to compression of the left subclavian artery with an enlarged left atrium (Popov's symptom).

In some diseases, additional *characteristics of the pulse* are also described - the *magnitude and shapes*, which are part of its fullness and tension.

The pulse of increased fullness and tension is called *large (pulsus magnus)* and occurs with high blood pressure, hypervolemia, stress.

Pulse of weak fullness and soft is called *small (pulsus parvus)* and is detected with a low stroke output, a small pulse arterial pressure.

Fast and high, jumping (pulsus celer et altus) is a pulse with a swift rise and fall in the pulse wave, greater than normal, of the amplitude. It is observed with aortic valve failure (high pulse blood pressure), open arterial duct, hyperthyroidism, anemia, fever, complete atrioventricular blockade.

Pulse with a slow rise and fall of the pulse wave is called *slow (pulsus tardus)* and is observed with hypovolemia, left ventricular dysfunction, constrictive pericarditis and mitral stenosis. With stenosis of the aortic orifice, the pulse is *small and slow (pulsus parvus et tardus)*.

The double pulse (pulsus bisferiens) has two systolic spikes and is characteristic of aortic insufficiency and hypertrophic cardiomyopathy. The pulse wave initially rises very rapidly and rises (the first peak), then a decline occurs due to dynamic obstruction of the aorta, and then a second systolic wave appears (continuation of the ejection of blood from the heart).

Dicrotic pulse (pulsus dicroticus) also has two waves, but one of them is systolic, and the other is diastolic. It occurs at a very low stroke volume (most often it is dilated cardiomyopathy).

The alternating pulse (pulsus alternans) is characterized by a regular rhythm with alternating pulse waves of large and small amplitude and is caused by alternation of cardiac contractions with severe left ventricular dysfunction or atrial fibrillation.

The pulmonary pulse (pulsus bigeminus) is caused by the alternation of pulse waves different in strength against the background of ventricular extrasystole as bigemini (every second reduction is ecstasystolic).

The paradoxical pulse (pulsus paradoxus) is caused by decline in systolic blood pressure and the amplitude of pulse waves by inhale. Normally systolic blood pressure on inhale decreases by 10 mm Hg. and, with cardiac tamponade, chronic obstructive heart diseases and obstruction of the superior vena cava, is much stronger, as a result of which the pulse on the peripheral arteries on inhalation may completely disappear.

The state of the vascular wall outside the pulse wave is determined by clamping the radial artery with a third and index finger until the pulsation stops. The middle finger palpates the artery. In healthy individuals, it is not felt outside the pulse wave, and in atherosclerosis due to the compaction of the arterial wall, it is defined as a dense strand.

In some cases, the pathological changes in the pulse are determined in the carotid, temporal, femoral, popliteal and other arteries. For example, with atherosclerosis of the vessels of the legs, there is often a decline in the amplitude of arterial oscillations or the absence of their pulsation, especially often on the arteries of the rear of the feet. Simultaneous palpation of pulsation of pulse on the radial and femoral arteries (in norm it coincides) let suspect coarctation of the aorta. In this case, the pulse on the femoral artery becomes weak and delayed.

Palpation of the abdominal wall and abdominal organs

Palpation of the abdomen allows you to get information about the localization of the abdominal cavity organs, their shape, size, consistency and soreness.

Palpation rules of the abdominal wall and abdominal organs:

- the doctor sits right next to the patient's chair (not on the bed), facing the patient, observe his reaction;

- the patient lies on a firm bed (the body flexes on the soft bed, the pelvis rolls down that prevent muscles relax). The head with the shoulders should be slightly raised, being on the pillow. Hands are along the body. Outstretch legs or bend slightly in the hip and knee joints with support under the feet or place foam roller under the knees;

- the hands of the doctor should be warm in order not to cause a reflex abdominal tension, with short-cut nails. The doctor's hand is placed on the abdomen on the slightly bent 2-3-4-5th fingers (the base of the palm above the anterior abdominal wall, the thumb shouldn't palpate).

Palpation of the anterior abdominal wall

Start with a *superficial, light touch palpation*. The study begins with the left ileal area, then passes to the symmetrical site of the right ileal area, and gradually rising upwards (2-3 cm), palpating all parts of the abdomen. You can bypass the stomach counter-clockwise, starting from the left iliac area and ending in the right ileal area. After that, palpate along the middle line from the epigastric area to the suprapubic.

With superficial palpation, the abdominal wall tension, its soreness in one or another area, the sharply enlarged liver or spleen, large tumors, the divergence of the rectus abdominal muscles, hernial protrusions and tumor-like formations located superficially are determined.

Usually the palpating hand does not meet any resistance, the abdominal wall is soft and supple. In pathology, there is an increased tension, while the resistance and muscular tension (*defense musculaire*), which result from contraction of the abdominal muscles, it reveals the visceromotor reflex.

Resistance is perceived as a slight resistance to the abdominal wall and occurs only during palpation, decreases or disappears when distracting the patient's attention and is accompanied by a slight soreness. It is observed only in limited areas corresponding to the location of the affected organ. Thus, with duodenal ulcer, resistance is observed in the epigastric area, with inflammation of the gallbladder - in the right hypochondrium.

Muscle protection is associated with inflammation of the parietal peritoneum and is characterized by an evident abdominal wall tension. It can be local (limited peritonitis) or diffuse, if the peritoneum cavity ("wooden belly") is affected, and the palpation of the abdomen is very painful.

2. Methodical, topographic, sliding, deep palpation, developed by V. Obratzsov and N. Strazhesko, allows you to determine place, size, shape, consistency of the abdominal cavity. The principle of the procedure is that the doctor put his fingers deep into the abdomen, trying to squeeze the organ under investigation into the back wall of the abdominal cavity or bone, in order to limit its mobility and get a clearer feeling. During palpation, the right hand is placed flat on the anterior abdominal wall perpendicular to the axis of the part of the intestine or to the edge of the organ. Ask patient to breathe deeply into abdomen. During the inhalation, the doctor, moving the skin, takes a skin fold (in order not to restrain the movement of the hand). During exhalation, the hand

is slowly put deep into the abdominal cavity, painlessly for the patient approaching the posterior abdominal wall. It is possible to penetrate the abdominal cavity gradually for a series of 3-5 deep respiratory movements. After that, sliding movements of the fingers across the organ under investigation are made. At the moment of sliding of fingers from an organ there is a sensation which helps to determine its place, the form and a consistence.

Methodical, deep palpation is *according to strict sequence*: first the sigmoid colon is palpated, then the blind, the terminal part of the ileum, the transverse colon, the ascending and descending part of the colon, the stomach, pancreas, liver, spleen and kidneys.

The sigmoid colon is palpable in the left ileal area.

The first way. Put four closed, slightly bent fingers of the right hand are perpendicular to the axis of the sigmoid colon, which is obliquely in the left ileal area, with the base of the palm located on the outer surface of the ilium. During the inspiration of the patient, a skin fold is formed in the direction towards the navel (away from oneself). After this, during the exhalation, they try, as deeply as possible, to put the fingertips into the abdominal cavity so that they approach to its back wall. Then the movement of the hand from the inside to the outside and from top to bottom, sliding along the back abdominal wall "roll" across the gut. At this moment you appreciate palpable area.

The second way. Put four closed, slightly bent fingers of the right hand are perpendicular to the axis of the sigmoid colon, with the palm base turned towards the midline of the abdomen. During the inspiration of the patient, the skin folds. After this, during exhalation, the fingertips are put in the abdominal cavity to its posterior wall and, with a subsequent inspiration, raise the gut to the iliac crest.

Sigmoid colon is palpated in 90-95% of healthy individuals as a smooth, elastic cylinder, it is as thick as a finger.

In pathology, the spasmodic gut can be felt as dense, painful, sometimes crisp or bumpy. It can be bloated, rumbling. With fusion or scars of the mesentery, the sigmoid colon may lose its mobility.

Cecum. During palpation of the cecum, which is in the right ileal area, use the same procedure as palpating the sigmoid colon, changing only the direction of movement of the investigating arm. The palm rest on the outer surface of the right ileal bone and the fold is made from yourself. The bowel is pressed against the posterior abdominal wall and the ilium.

The cecum is normally palpable in 79% of cases in the form of a smooth, slightly widening downward cylinder 3-5 cm in diameter, painless and mobile, rumbling under pressure.

In pathology, it can be extremely mobile due to congenital lengthening of the mesentery or motionless due to inflammation around it. Inflammation of the cecum is accompanied by its swelling, increased rumbling, the start of pain and denseness. With tuberculosis and cancer, it becomes very dense, tuberous.

Transverse colon. In the study of the transverse colon use bilateral palpation. The doctor's hands lie on either side of the rectus abdominal muscles at the navel, although it is desirable to first find the lower border of the stomach and back away from it 2-3 cm down. The fold during inspiration is made from yourself and gradually put the fingers into the abdominal cavity on exhalation. After reaching the back wall of the abdominal cavity, on the inspiration they glide along it, trying to feel the gut under the fingers.

The normal transverse colon is palpated more than half of healthy people (60-70%), in the form of a soft cylinder 3-5 cm wide, painless, easily moving up and down.

In colitis, the transverse colon is palpable, dense, shortened and painful. In the cancer, it is thickened and tuberous. If below it there is a constriction or disruption of the patency, the transverse colon remains smooth and elastic, but increases in volume, peristals and loudly rumbles.

Ascending part of the colon. For palpation of the ascending part of the colon, the left hand is placed under the waist, and the right hand is put in the right lateral abdomen, facing the palm from the outside, fingers to the navel. Synchronously with the patient's breathing, a skin fold is drawn from yourself and put the hand into the abdominal cavity until it touches the left arm and on the inspiration slide in the lateral direction until a sensation of contact with the intestine arises.

Descending part of the colon. For palpation of the descending part of the colon, the left hand is placed under the lower back, and the right hand is in the left lateral abdomen, facing the palm of the palm to the navel, fingers outwards. Synchronously with the patient's breathing, a skin fold is drawn from yourself and put the hand into the abdominal cavity until it touches the left arm and on the inspiration slide in the medial direction (to the navel) until a sensation of contact with the intestine arises. These segments of the intestine are probed as elastic, painless cylinders.

Stomach. Palpation of the stomach is very difficult. V.Obrazcov believed that large curvature was palpable only in 50-60% of people, and small only when the stomach was clearly lowered. You can palpate the stomach in a standing and lying position.

In order to palpate the greater curvature, you need to find the lower border of the stomach, using percussion palpation or auscultative percussion (see "Percussion").

Palpation of the stomach is in the epigastric or mesogastric region, given that the greater curvature of the stomach is defined as a roller lying on the spine and on its sides. Therefore, the large curvature of the stomach is palpated along the middle line and on both sides of it, inhaling

the abdominal skin upward, on exhalation, putting the hand deep into the abdominal cavity towards the back wall of the abdomen. At the inhalation, the great curvature of the stomach slips out from under the fingers and gives a feeling of a soft, thin fold on either side of the median line 3-4 cm above the navel. If the stomach is lowered, it is found below the navel.

Pancreas. Palpation of the pancreas is performed in the lying position after cleansing the bowel with a cleansing enema and, if possible, rinsing the stomach. The normal pancreas can be palpated extremely rarely (with significant omission, flabby abdominal wall). In these cases, the pancreas is palpated in the form of a completely immovable strand 1-2 cm thick, located horizontally on the posterior abdominal wall in the upper half of the abdomen.

Palpation of the pancreas can be superficial and deep. With superficial palpation, a number of symptoms of acute pancreatitis can be detected. This is a significant soreness in the right and upper parts of the epigastrium, sometimes extending to the left. On the second day of the illness, muscle tension usually appears. Sometimes it is possible to identify a site of muscle soreness and tension, corresponding to the projection of the pancreas (Kurt's symptom).

During deep palpation of Obratsov-Strazhesko it is usually possible to probe only the increased and condensed pancreas. In order to do this, you first need to determine the lower border of the stomach, above which by 2-3 cm and the pancreas is there. Then, when inhaling, the skin fold is picked up, with exhalation penetrate into the abdomen to get a sensation of its dense back wall. Leaving the fingers in the same position with the subsequent inspiration, they make a sliding movement up and down.

Liver. The study is performed in the lying position on the back, the arm rest on the chest. In some cases, (for example, ascites, meteorism), palpation is best done in an upright position. The patient thus should stand, slightly bending forward and breathing deeply.

Palpation of the liver is performed in a *bimanual* way. In order to do this, the left hand covers the right costal arch (lower two ribs), which limits the expansion of the chest during the inspiration period, contributing to an increase in the amplitude of the liver movement in the vertical direction. The palm of the right hand on the midclavicular line is put flat on the right iliac area, slightly bent, the fingers on the same line are parallel to the detectable edge of the liver. On inhalation, a skin fold is drawn on yourself, on exhalation the fingers are put deep into the abdomen like a "pocket". At the subsequent deep inspiration (which the patient makes at the request of the doctor), the liver, sinking downwards, slips out of the "pocket", giving the opportunity to determine the position, consistency, soreness of its lower edge. If the fixed fingers during the inhalation period do not meet the edge of the liver, then the hand should be gradually advanced to the right hypochondrium, repeating the manipulation until it comes into contact with the organ. If the edge of the liver is below the costal arch, do not limit it to palpation only on the mid-incision

line, you need to trace it to the right and left as far as possible. In the presence of enlarged and compacted liver, its margin can be determined and regardless of the phases of breathing.

The following properties of the edge of the liver are evaluated:

- *Localization with respect to the costal arch.* In a healthy person, the edge of the liver is at the edge of the costal arch.

- *Consistency and shape of the edge.* In a healthy person, the liver has a soft consistency. When the blood stagnates in the liver or hepatitis, its edge remains soft and pointed. With cirrhosis, the edge becomes dense.

- *Outlines of the edge.* Normally, the edge is even. With some diseases (tumor, terminal stage of cirrhosis of the liver), the edge becomes uneven, scalloped.

If possible, *assess the liver surface* (smooth, even or tuberos).

- *The painful edge of the liver* appears with hepatitis, stagnation in the liver, cancer, fatty hepatosis, acute cholangitis, attack of cholelithiasis and perihepatitis symptoms.

- *Pulsation of the liver* can occur if the tricuspid valve of the heart is deficient, congestive heart failure along a large range of blood circulation.

In the case when the edge of the liver cannot be clearly felt, you can use a *balloting palpation*. Folded together with the tips of the half-bent fingers of the right hand, jerky strokes are made along the anterior abdominal wall, starting from the edge of the costal arch downward until the fingers feel the disappearance of the characteristic resistance over the liver. Having approximate records, you can try to make a palpation of the liver again at this level.

Some authors believe that the edge of the liver is not normally palpable.

Spleen. The spleen is examined in the position of the patient on the back, with stretched arms and legs. With your left hand, placing your palm on the area of VII-X left ribs, the doctor limits, if possible, the mobility of the chest. The right palm is laid flat on the abdomen, perpendicular to the costal arch, so that the index and middle fingers are, approximately, at the attachment point X of the rib to the costal arch. With palpation, the same procedure is used as for palpation of the liver. On inhalation, the skin folds onto yourself. During the exhalation, the hand is slowly put in the left hypochondrium and, leaving the fingers in place, they ask the patient to take a deep breath. At this point, there is a certain tactile sensation.

If the spleen is not probed in the patient's position on the back, the examination is performed in the position on the right side. The patient is offered to put his hands under his head and bend the left leg in the hip and knee joints, stretching the right one. The doctor repeats palpation by the same method.

A healthy spleen is not palpated. *Increased spleen* is observed in acute infectious diseases, blood diseases, malaria, liver cirrhosis. With chronic infectious diseases, blood diseases, the spleen becomes dense, the edge often retains a rounded shape.

Kidneys. The kidneys are on the posterior abdominal wall and are covered by a costal arch, so their palpation in a healthy person is extremely difficult. In a healthy person, kidneys can be palpated in case of sudden weight loss or a significant weakening of the abdominal press.

Palpation of the kidneys is performed *bimanally* in two positions of the patient, horizontal and vertical (according to Botkin), keeping the general principles of deep palpation.

Palpation of the kidney in a *horizontal position*. For palpation of the right kidney, the left hand with the palmar surface is put on the right half of the lumbar area immediately below the XIIth rib. Slightly bent four fingers of the right arm are put directly below the costal arch outward from the edge of the rectus abdominal muscle. With each exhalation the doctor seeks to move the fingers of his right hand to the back wall until he feels in touch with the fingers of his left hand. With his left hand, the doctor lifts the lumbar area to the front, thereby bringing the kidney closer to his right arm. At the maximum approach of the hands, the patient is offered to take a very deep breath in the belly. At this moment, the kidney descends, appearing under the fingers of the right hand, which perform a sliding downward motion, probe the lower pole of the organ, and more rarely the entire kidney. Palpation is performed parallelly to the spine. The kidney is palpated in the form of a dense, elastic formation. If the kidney can be held between the hands, we can estimate the degree of its displaceability.

For palpation of the left kidney, the left hand of the doctor moves forward under the left half of the patient's waist, with the right hand palpation is performed according to the described procedure.

The technique of palpation of the kidneys in an *upright position* was proposed by S.Botkin. The patient stands facing the doctor, abdominal muscles relaxed, the body is bent slightly forward. The doctor sits directly in front of the patient. The same procedure is used as in the prone position.

In an upright position due to gravity and due to the pressure of the descending diaphragm, the kidneys become more accessible for palpation, but detailed palpation is difficult due to the strain of the abdominal press. Therefore, kidney palpation is performed in both horizontal and vertical positions.

Sometimes the palpation of the kidney is possible only thanks to a special method - *balloting (the Guyon method)*. To the above described methods of ordinary bimanual palpation rhythmic jabbing movements of the fingers of the left hand are added. Fast and short strokes are applied to the lumbar area in the corner between the costal arch and the long back muscles. The fingers of the right hand will feel the vibrations of the kidney.

Normally, the kidneys are not palpable. Palpation of the kidneys allows you to determine the *omission of the kidneys (nephroptosis)*. The omission of the kidneys can be different:

I degree - the lower pole of the kidney is palpated;

II degree - mobile kidney, the kidney is palpated completely, but does not go beyond the spine;

III degree - a wandering kidney, the kidney is palpated completely and displaced in the other half of the abdominal cavity (relative to the spine).

Enlargement of the kidney is found in hydronephrosis, polycystosis, tumor (hypernephroma).

Bladder. With a significant accumulation of urine in the bladder, especially in individuals with a thin abdominal wall, the bladder is palpable above the pubis as an elastic, fluctuating formation. With significant overflow, the upper border of the bladder can be palpated at the level of the navel.

With the *accumulation of free fluid in the abdominal cavity*, **balloting (jabbing) palpation** is performed in the supine position. The left arm is laid flat on the side surface of the abdominal wall, and the fingers of the right hand are punched impetus on the abdominal wall from the opposite side. If there is liquid in the abdominal cavity, then the oscillations of the fluid and internal organs are given to the other arm ("wave symptom"). If the assistant puts the hand in the middle of the abdomen, the transfer of vibrations stops.