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SYSTEM OF DIAGNOSIS OF PLEURA DISEASES

Pleural diseases can have a variety of origins. They are inflammatory (specific or nonspecific), dystrophic, neoplastic (primary or secondary, benign or malignant), and systemic. The main symptom of pleural disease can be a symptom or complication of many diseases of the organs in contact with the visceral pleura (mediastinal or diaphragmatic). There are cases of pleural effusion syndrome (PES) in conditions of extrathoracic localization. The total number of diseases that accompany PES reaches 93.

The main subjective symptoms – pain and shortness of breath – often motivate the patient to start self-medication or seek relatives' or friends' advice. The pain is caused by irritation of the sensitive somatic nerves of various parts of the parietal pleura. Usually, the process manifests itself in the form of its hyperemia, edema, additional formations, layers, adhesions, pathological accumulation of effusion, lymph, blood, foreign bodies. Shortness of breath is caused by irritation of vegetative figures by the same factors or removal from the external respiration of one or another part of the lung, displacement of the interstitium, pressure on the heart, and large vessels, diaphragm. In both the first and second cases, the patient's

sensitivity threshold to these stimuli can differ significantly.

The following table 1, which shows the sequence of physical examination of a patient with suspected pathological process in the pleural cavity, will help a doctor to deal with the complaints and subjective symptoms.

The primary objective syndromes that accompany the pleural disease are pleural effusion and pneumothorax. The first is observe most often and, accordingly, is of paramount importance in diagnosing pathological processes in the pleura.

The accumulation of effusion or any other fluid in the pleural cavity is called pleural effusion syndrome (PES). But unfortunately, even today, for the most part, without thinking about the significance, this syndrome is called pleurisy not only by practitioners but also by scientists. It isn't delightful to read in certain magazines definitions that do not correspond to the case's essence. For example, hydrothorax in nephrosis or heart failure is often called pleurisy! Hydrothorax in amyloidosis or liver failure, without hesitation, is attributed to pleurisy. If these were isolated cases! **Recall that pleurisy is an inflammatory process, and inflammation is a typical pathological process that occurs due to tissue damage by appropriate agents. It is manifested by structural, functional, and metabolic disorders on the background of microcirculation**

disorders. This definition is given to inflammation by pathophysiologists. Thus, PES is the only pleurisy when it accompanies the above local pleural and general changes that characterize inflammation and are always observed in it, wherever it occurs. So, is there «pleurisy» in this particular case with PES or not – you need to prove! And this is a complex differential diagnostic process. The latter's difficulty is not so much that the pleural cavity is closed for its study but that the SPV can accompany the thoracic cavity's disease, including pleura and extrathoracic diseases. In some cases, the syndrome develops as a pathophysiological manifestation of the disease, and – as a complication of these diseases. Diagnosis of most pleural diseases, including inflammatory – pleurisy – and disorders of tumor origin, should begin and proceed from the central syndrome, namely – pleural effusion syndrome. The same direction should have diagnostics at the involvement of a pleura in pathophysiological processes at vascular or metabolic diseases. What is its specific weight, and what place does this syndrome occupy in clinical practice?

H. Magnussen (1987) reported that in the United States, pleural effusion of cardiogenic origin is diagnosed annually in 500 thousand patients, effusion of another source – in 1 million patients. The main causes of effusion in the absence of heart disease, the author calls inflammatory, oncological,

and thrombophlebitic processes. Other reasons leading to the accumulation of pleural effusion may be more or less different not only in different countries but also in different regions due to the regional specificity of the disease. Thus, in the Bashkir AR, Mordovian AR, Armenia, and Western Siberia, the PES of tuberculosis genesis, among other forms of intrathoracic tuberculosis in the 80s of the last century, was 4.9–16.4 % (I. V. Afanasyev et al.). It should be borne in mind that this syndrome is not recorded separately but passes under the heading of diseases that it accompanies or complicates in our statistics. The reason for this state of affairs was the preliminary study of pleural diseases, as a result of which most authors believed that pleurisy is always a secondary pathological process, no matter what its genesis: specific or nonspecific.

In the pre-antibacterial era, most researchers considered PES a consequence of tuberculosis in 87–100% of cases (V. A. Ravych-Shcherbo, G. R. Rubinstein, A. A. Kisel). At the end of the last century in the CIS countries, pleural effusion was associated with malignant neoplasms in 16.9–22% of cases (I. D. Duzhiy, S. H. Tabidze, Y. L. Semenenkov, and A. E. Gorbulin). In addition, Z. Vogt-Moy Kopf and H. Zullig found malignant genesis in pleural effusion syndrome in 47.5 % of patients. According to the latest data, lesions of the pleura of tuberculous origin in 87–

92 % are observed in primary tuberculosis and only in 8–13 % – in secondary.

In general, it is estimated that PES occurs in more than 93 different diseases of intrathoracic and extrathoracic localization (I. D. Duzhyi, 1998–2008). The reader will get acquainted with the technology of diagnosis of some of these diseases below. For now, we emphasize that this syndrome, in addition to tuberculosis and tumors, is most often caused by heart disease, nonspecific inflammation, systemic diseases, and injuries. The frequency with which these diseases cause PES is as follows: tuberculosis – 52 %, cancer – 18 %, nonspecific inflammation – 12 %, cardiac and vascular diseases – 9 %, chest injuries – 2.5–3 %. It is easy to calculate that the combined diseases cause pleural effusion in approximately 90 % of cases. It is clear that in today's conditions, the most important is the timely diagnosis of these diseases, and among them – tuberculosis and cancer. These two processes account for 70 % of diagnosed pathological processes accompanied by pleural effusion syndrome.

The importance of timely diagnosis of tuberculous lesions of the pleura is based not only on a significant number of specific processes in the whole mass of patients with PES. It is due to the complexity of diagnosis and treatment of patients with tuberculosis in general and such pleural lesions in particular. On the other hand, the

timeliness of diagnosis of pleural tuberculosis is due to the significant duration of the treatment process, which can last from 6 to 12 months, followed by preventive treatment for several months twice a year for 2–3 years dispensary observation. These figures eloquently indicate that patients with such processes in social terms for a very long time detached from society and socially beneficial work, which often harms their attitude to such. We do not provide estimates of the financial costs reported by the state and the patient's family in the event of such a diagnosis. We will only add that the above figures were average in terms of the duration of treatment. The course of the disease largely depends on the time of diagnosis and treatment. But even with a timely process in 10–12 % of patients, there is chronicity of the disease, which significantly affects its consequences and the nature of rehabilitation of patients.

It is essential in this situation that patients who have suffered from specific pleurisy and have not been treated long enough or not intensively enough, after some time may develop secondary organ tuberculosis: tuberculosis of the lungs, kidneys, testicles or their appendages, ovaries, bones, spine and even meninges and brain, etc. Just listing the possible spread of tuberculosis after specific pleurisy is enough to understand the importance of a responsible attitude to the diagnostic and treatment processes in pleural

disease and PES. According to the literature, among patients who suffered from pleural tuberculosis and were not treated at all or treated insufficiently, pulmonary tuberculosis developed in 8.2–43.3 % of cases (V. L. Einis, 1965; A. G. Rabukhin, 1976; A. G. Khomenko, 1981).

On the other hand, it is known that in young people, the pleural lesions of tuberculous origin are more often observed, and in older people – pathological processes of oncological nature. This limit is considered to be forty years old. This difference is evident after 60 years (M. I. Borovskaya, K. Kokkola). At the same time, it is known from the American literature that with an unknown etiology of effusion, 25–30 % of such patients are diagnosed with malignant processes of primary or secondary genesis in a few months, sometimes years. At the same time, patients with timely analyzed primary oncological processes can be radically operated, and in secondary – appropriate means of special treatment are applied. In these cases, the moral and psychological aspects and possessions are difficult to overestimate, which is an additional strong argument for timely diagnosis. Despite these arguments, in the last 2–3 decades, there has been a significant trend towards the pathomorphosis of many diseases, the main of which in modern conditions is tuberculosis. Given the latter, up to 11.5 % of patients with pleurisy are hospitalized with an old or chronic form of the

process and its various complications (Y. L. Semenenkov, A. E. Gorbulin). In addition, from 10.4 % to 12 % of pleurisy in the process of treatment is transformed from acute to chronic. During their development, fibrothorax is gradually formed as the third stage of chronic inflammation of the pleura, whatever its genesis. Under these circumstances, the inevitability of developing the pulmonary heart (PH) is clear (S. S. Weil, T. L. Malaya). These complications can be prevented by a timely diagnosis of PES, verification of its etiology and targeted etiopathogenetic treatment, adequate scope, and duration. In the case of chronicity of the process to prevent drugs, it is necessary to resort to reconstructive surgery to relieve fibrous constriction of the lungs and heart – pleurectomy.

The clinical manifestations of PES are determined by the amount of effusion, its localization in the pleural cavity, the presence of adhesions, layers, lung motility, diaphragm and interstitium, individual features of innervation of these formations and the threshold of sensitivity of the individual to certain stimuli. The variety of combinations and combinations of these factors can so «change» the subjective sensations, especially pain, that it will rather resemble pathophysiological processes in other, sometimes significantly distant organs. In connection with the above, such syndromes should be called «altered» or «replaced»

or ersatz-syndromes. Knowledge of such syndromes will help most doctors avoid gross diagnostic errors, sometimes even those that cost lives. Here is their description.

Pleuroabdominal syndrome is accompanied by severe abdominal pain, sometimes with typical irradiation or cramp-like manifestations. Possible autonomic disorders: nausea, vomiting, sweating, fever. The syndrome may resemble an «acute abdomen», and there are known laparotomy cases, the consequences of which are tragic. Crucial in the differential diagnosis is given to the medical examination. The tongue in this syndrome, in contrast to the «acute abdomen», is moist, not coated. The abdomen is «involved» in breathing, although somewhat limited. The patient quickly changes the position of the body in bed, which is difficult or impossible to do with an «acute abdomen». At superficial palpation, pain is not found. With a gradual increase in pressure, local pain can not be founded. Symptoms of irritation are questionable. But all of the above can be established by a calm examination of the patient, the examination without any haste. In a sitting position, the pain decreases, and it is impossible to localize it at all, which is manifested in acute diseases of the abdominal cavity. At last, hypertension of skin of a stomach that does not happen at disorders of a pleura comes to light.

Pleurocardiac syndrome resembles coronary heart disease, sometimes even with symptoms of irradiation and emotional stress, and anxiety. In contrast to the constant irradiation in coronary heart disease (CHD) in disorders of the pleura, such pain is exacerbated by breathing, especially deep. With coronary heart disease, the patient is pale with cyanosis, feverish blush, rapid pulse, arrhythmic, blood pressure decreases. In disorders of the pleura, these phenomena are not observed. With coronary heart disease, symptoms of left ventricular failure may occur, while with pleural diseases, right ventricular failure. Electrocardiographic examination data often state the phenomena of ischemia of the posterior ventricles.

Pleurothromboembolic syndrome usually develops within a few minutes. It is challenging to diagnose in patients with the prerequisites for possible embolization: impaired venous blood flow in the inferior vena cava and extremities, diseases of the pelvic organs. The pain is often severe, significant tachypnea, sometimes wheezing, which can be heard in the distance, resembling pulmonary edema, tachycardia, lowering blood pressure. At diseases of a pleura, the listed has the opposite tendency. Most often, the pain syndrome occurs with limited effusion. It can be established only by multidisciplinary radiography or ultrasound.

Pleurocostal syndrome more often «leads» the patient to a neurologist, surgeon, or traumatologist. The disease is manifested by pain localized along the ribs, resembling intercostal myositis or neuritis, sometimes – periostitis or osteomyelitis. If the patient has a history of injuries, hypothermia, or drafts, the doctor's opinion changes in this direction, and the introductory provisions regarding the examination of patients are forgotten. The consequence of this is a misdiagnosis, with which patients are often treated for weeks or even months.

Pleurobrachial syndrome is characterized by pain in the shoulder girdle, supraclavicular or scapular area. There are known cases of the syndrome, even on the contralateral side. As a rule, there is a syndrome when the effusion is localized in any area above the diaphragm.

Pleuroishioradicular syndrome resembles radiculitis or sciatica. The patient is treated for a long time by a neurologist. The pain of this disease is exacerbated by deep breathing, sighing, coughing, or sneezing. All this makes such patients sometimes even sleep in a sitting position.

Pleurorenal syndrome resembles colic in urolithiasis. The absence of changes in the urine is then interpreted as «exclusion of the kidney by obstruction by a non-contrast stone». And minor changes (a small number of erythrocytes or leukocytes) are considered to confirm the

«movement of sand». However, it is known that minor changes in the urine may be in PES, which reflects the effects of intoxication.

Table 1 – The sequence of physical examination of the thoracic cavity in suspected pleural disease

Research method	Pleural effusion	Pneumo-thorax	Emphy-sema	Pleural fibrosis	Fibro-thorax of pleural genesis	Pulmo-nary fibrotho-rax
Review: a) intercostal space smoothed, protruding	+	+	+	–	–	–
b) intercostal inflammation, involved	–	–	–	+–	++	+
Palpation: vocal tremors	–	–	+	+	+–	+
Percussion: dullness	++	–	–	+	++	+
tympanitis	–	++	+	–	–	–
Auscultation: respiratory noises	–	–	+	+–	+–	+
Asymmetry of the torso and chest	+	+	+	+–	++	+
Respiratory movements of intercostal muscles	+–	+–	+	–	–	+–

++The symptom is well defined.
+The symptom is determined.
+–The symptom is poorly defined.
–The symptom is not defined

These types of ersatz syndromes should adjust primary care physicians – family, district, ambulance – to a sufficient collection of complaints and medical history. Especially important is the timely and clear performance of physical examination of patients according to table. 1.

In the first stage of inspection, the preliminary syndrome diagnosis – PES has to be established. Its factors are the absence of vocal tremors on palpation, dullness on percussion, and lack of breathing on auscultation.

The next, second examination stage should translate the previous syndrome diagnosis into a probable one. For this purpose, radiological methods of inspection are most often applied. Most often – review radiography. If at the first stage of the examination no signs of pleural effusion are found (smoothed intercostal spaces, absence of vocal tremors, dullness during percussion, lack of respiratory noises during auscultation), the radiological examination is not performed. We recommend appropriate treatment for 2–3 days and only when the «friction of the pleura» to perform a radiological exam. The following radiological phenomena are possible.

In the **first** – para costa eclipse along the outer perimeter of the hemithorax transversely from 10 mm. The medial contour of the eclipse is smooth and precise in contrast to the layers. The eclipse extends from the II–III ribs and sometimes from the

arch to the costodiaphragmatic sinus, sometimes filling it.

In the **second** – the eclipse fills the costodiaphragmatic sinus, sometimes reaching the middle of the diaphragm. The upper contour of the eclipse is equal or concave in the direction of the sine.

In the **third**, the eclipse fills the cardiodiaphragmatic sinus, sometimes reaching the middle of the diaphragm.

In the **fourth**, the eclipse is located in the lower parts of the hemithorax, merging with the diaphragm and wholly or partially filling the external sinus and cardiodiaphragmatic angle. The upper contour of the eclipse is often incorrect. As a rule, «lower lobe pneumonia» is diagnosed.

In the **fifth**, the eclipse fills a significant part of the hemithorax with the upper medial border, located from the II–IV ribs to the cardiodiaphragmatic angle, or fills the entire hemithorax.

In the **sixth** option – the eclipse is placed paramediastinally, merging with the latter. Its upper contour may reach the vault of the pleura, and the lower – connects with the right or left the shape of the heart. It is almost impossible to determine the boundary of the latter. The contour of the eclipse is smooth, precise, which gives the impression of displacement or expansion of the interstitium.

In the **fourth** and **sixth** radiological variants of the syndrome of accumulation of effusion in the pleural cavity, doctors often mistakenly treat basal pneumonia, moderate pneumonia, pneumonia S_I or S_{VI}. It is known that even lateral radiography often does not help the doctor but directs the opinion of the clinician in such a wrong direction.

In the **seventh** variant, an eclipse is determined in the lower part of the hemitorax in the projection of the middle parts of the «lower part», which resembles its inflammation. The outer part of the eclipse is less intense and not very clear. The medial aspect of the lung may be unchanged. Above the specified eclipse, the condensed drawing of the top particle is defined. The lateral radiograph reveals an intense lenticular eclipse located in a sizeable interparticle gap between the basal segments of the lower lobe and the segments of the middle lobe. This option characterizes the interparticle effusion.

In the **eighth** variant, the review radiograph shows an intense or relatively intense eclipse in the upper parts of the hemithorax, which is perceived as an eclipse of the «upper lobe», but its lower edge does not correspond to the limit of this lobe (C_{III}). The medial part of the lobe is unchanged. The eclipse acquires a lenticular character on the lateral radiograph, being located between the C_I and $S_{I–II}$ of the upper lobe. This option, like the seventh, characterizes the interparticle effusion.

In the **ninth** variant, darkening is detected in the upper and lower lungs, which corresponds to the upper and lower lobes. The lateral radiograph shows a lenticular eclipse that is directed from right to left (in the left process) or from left to right (in the right process), located between the upper spine and the cardiodiaphragmatic angle. The eclipse is located between $S_{I–II}$ and C_{VI} in the upper divisions and between the basal segments and the middle lobe in the lower divisions. Its substrate is a pleural effusion, which fills a sizeable interparticle gap.

In the **tenth** variant, a uniform eclipse with relatively precise outer contours, sometimes spherical, is located in the middle part of the right hemithorax, localized closer to the interstitium, resembling a tumor. The lateral radiograph shows a lenticular formation located between the sternum and the lower parts of the lung root.

There are limited parietal eclipses in the **eleventh** variant, single or multiple, resembling a goose egg or lens cut lengthwise. This eclipse is characteristic of encapsulated effusion. In contrast to the first variant of the eclipse, which characterizes its free accumulation, the eclipse in the eleventh variant must be differentiated from solitary mesothelioma. Still, eclipses in mesothelioma resemble «whole eggs». Bagged effusion is located more often in the upper parts of the hemithorax, which can be explained by the predominant localization of sagittal adhesions in

this part of the pleural cavity, between which the effusion accumulates. This localization of adhesions is described in the selective localization of tuberculosis in the upper lung segments.

The main common feature of the above radiological phenomena of PES is the displacement of the mediastinum in the direction of the opposite hemithorax. The level of displacement is determined by the amount of effusion, i. e., the size of the darkening of the affected pleural cavity.

Directions for the diagnosis of radiological phenomena of PES should be as follows. In the first type, the effusion should be differentiated from pleural layers and diffuse mesothelioma. In the second – with atelectasis C_X of the lower lobe and solitary mesothelioma of the lower pleural cavity, complicated by pleural effusion. In the third – with atelectasis of the middle lobe of any genesis, including based on tumors, with lipoma of the cardiodiaphragmatic angle, coelomic cyst of the pericardium or its diverticulum, with diaphragmatic hernia and sequestration of the lung with aberrant blood supply. In the fourth variant – with pneumonia of the lower lobe or infiltrative tuberculosis, pulmonary embolism (pulmonary artery). In the fifth – with atelectasis of the lower lobe or its tumor, in the sixth – with central lung cancer, thymoma, lymphogranulomatosis, intrathoracic sarcoidosis, esophageal diverticulum,

neurinomas, and other tumors. In the seventh, eighth and ninth, with pneumonia of the upper, tumor of the lower or middle lobes; at the tenth – with a tumor C_{III}, $C_{IV–V}$, C_{VI}; at the eleventh – with tumors of the ribs or soft tissues of the chest wall, mesothelioma.

But for many reasons, despite such a variety of X-ray morphological syndromes, in 75–80 % of cases, the first X-ray examination finds a disease far from pleural disease, and the syndrome is far from PES. In this percentage of patients, «pneumonia» is diagnosed, and appropriate treatment is prescribed, which lasts from 15 to 22 days. At the same time, two X-rays in dynamics are usually carried out. And only after the second they begin to see effusion, or «incomprehensible» process because the patient is referred for consultation to a phthisiopulmonologist or thoracic surgeon. Only 8–10 % at the first X-ray examination find pleural effusion, and the patient is either treated incorrectly or referred to a phthisiopulmonologist. Another 8–10 % do not see a pathological process in the thoracic cavity because it is not present in the lungs. In the pleural cavity, the amount of effusion did not have time to accumulate to a level that can be recorded by radiography.

So what to do? We have studied and tested the system of diagnosis of pleural diseases and SLE in practice, which is identical to pleural diseases

because all pathological pleural processes occur with PES. The first radiological examination of this system is performed by ultrasonoscopy, which can record the amount of effusion in the range from 5 ml and more.

Thus, the second stage of diagnosis of pleural diseases (radiation) ends with ultrasonoscopy and the probable establishment of PES. This probability indicates the next third stage of diagnosis, which is a puncture of the pleural cavity. This stage is performed in city or district hospitals. By hospital, we mean a medical association. It is ideal for achieving a pleural puncture in the clinic, which can be done by a surgeon or therapist. It is desirable, of course, that it be an experienced doctor, as this diagnostic technique can be complicated by traumatic pneumothorax, hemothorax, hemopneumothorax, and even air embolism of the small circle or blood vessels of the brain.

A puncture of the pleura is performed in the 1st, 2nd, 3rd, 4th, 5th, 11th radiological variants of SPV. The typical intercostal space is VIII–IX, but the final puncture is clarified after careful, quiet percussion. The puncture zone is most often posterior, less frequently the mid-axillary line. Depending on the level of development of subcutaneous tissue, the puncture is performed with a needle 60–70 mm or 120–140 mm long. The internal lumen of the needle should be 1.5–2 mm,

the cut – short, which is very important to prevent lung damage. Before puncture, it should be clarified whether novocaine or lidocaine injections have ever been given and the tolerability of these drugs. The patient's position is sitting, leaning on the back of a chair. We emphasize that the puncture is performed only to establish the reliability of the SPV. Therefore, the amount of aspirated fluid should be adequate for the task: clinical study, the study of lactate dehydrogenase (LDH), amylase and sugar, bacterioscopic, and, if possible – bacteriological. For the last two, the pleural fluid is taken in a sterile test tube. For the others – in a dry one. A total of 20–40 ml is enough for these studies. In case of dysfunction of external respiration, you need to take from 100 ml to a level that reduces shortness of breath. This position is one of the most important because the next stage is crucial in the etiological diagnosis of the process. The collection of more pleural fluid can lead to its complete elimination or subsequent rapid resorption, which is accompanied by the loss of fibrin and the formation of layers. The latter factors may prevent the imposition of artificial pneumothorax, without which the next stage of diagnosis – thoracoscopy – is impossible, and hence other differential diagnostic studies.

Thus, at this, the third, stage the reliable diagnosis of PES, comes to an end. Sometimes it can become etiological. For example, the detection

of lymph in the absence of changes in the lungs will indicate a pathological process in the thoracic duct; detection of lymph in the presence of interstitial-disseminated formations in females may indicate pulmonary leiomyomatosis; detection of hemolyzed blood in the fact of a history of injury – traumatic hemothorax; in the company of atypical cells – about primary or secondary malignant processes; in the detection of Mycobacterium tuberculosis (MBT) in the presence of focal-infiltrative, disseminated or destructive changes in the lungs – about pleural tuberculosis of secondary origin; at detection of MBT in the absence of changes in lungs – about primary tuberculosis of a pleura.

Therefore, the syndrome diagnosis includes a preliminary diagnosis of PES by clinical and physical methods. A primary care physician makes an initial public health care network diagnosis – a family doctor, a district doctor, a shop doctor, and an ambulance doctor. The probable diagnosis of SPV is established by ultrasonoscopy of the pleural cavity. Sometimes, depending on the level of the initial examination, the possible diagnosis may be a previous one.

A pleural puncture confirms the reliability of the pleural effusion syndrome. This level of diagnosis is already an indication for the next stage – causal diagnosis. It leads to PES more than 93 different diseases of the pleura, adjacent thoracic organs, extrathoracic processes, and common

diseases (systemic vasculitis, collagenosis, metabolic disorders, beriberi, etc.).

Wherever a reliable syndrome diagnosis is established, the patient should be referred to a tuberculosis surgeon or thoracic surgeon to verify the pleural process. Given that time is often a determining factor in the possibility of imposing an artificial pneumothorax. Hence, in the case of thoracoscopy, the patient should be referred to a specialist after a probably established effusion or immediately after a reliable pleural puncture. However, if there are no vital indications for a pleural puncture, it should be bypassed, shortening the patient's path to thoracoscopy.

Contraindications for referring patients to an appropriate institution to verify the process by thoracoscopy are direct signs of malignancy and cardiovascular failure. We emphasize! Chronic renal failure may not be a contraindication for thoracoscopy, as such patients are at risk for developing tuberculosis, including pleural tuberculosis. This diagnosis of chronic renal failure (CRF) will not be established in every patient, but the patient will receive reliable specific treatment if it is verified.

Thoracoscopy is performed under local anesthesia with 0.25–0.5 % novocaine or 0.5 % lidocaine. 2.0–4.0 ml of 50 % analgin is used for premedication. A puncture of the pleural cavity precedes the operation with the partial evacuation

of pleural fluid and replacement injection of oxygen into the pleural cavity – the imposition of artificial pneumothorax.

The operation is performed in the patient's position on the healthy side with a roller under it, which helps to spread the ribs on the opposite side and increase the intercostal spaces. With a free pleural cavity, the typical site for introducing the trocar and then the thoracoscope into the pleural cavity is the V intercostal space in the axillary region, which creates convenient conditions for examination of all parts of the pleural cavity with rigid types of endoscopes. With limited (encapsulated) effusions, entry into the pleural cavity is performed in the center of enveloping. Fibroendoscopes are the best.

Anesthesia is essential during thoracoscopy. An intradermal «lemon peel» is made, after which a needle is brought under it on the surface of the upper rib, and novocaine is injected. The same is repeated with the lower rib, but novocaine is injected over it. Then make a puncture of the pleura. After receiving air or liquid, the needle is slightly shifted back, which allows its tip to be above the parietal leaf of the pleura, then re-injected 10–15 ml of novocaine, which spreads over the parietal leaf of the pleura. After performing a skin incision up to 2–2.5 cm, a thoracocentesis is performed with the help of a trocar, and an endoscope is inserted into the pleural

cavity. Examination of the pleural cavity and lungs is performed systematically by a known method [1, 3]. The visual picture of the pleura in many diseases is quite typical, which gives grounds to diagnose after endoscopy. However, based on the teachings of the luminaries of Ukrainian phthisiopulmonology, the examination of the pleura necessarily ends with a targeted biopsy of its various areas on the border between visually altered and healthy regions. Most often, 4–5 bites are made. Biopsies are used to make smears on glass for cytological examination. Biopsies are placed in alcohol and sent for histological analysis. One or two – for bacteriological. All this makes it possible in a few days to have additional data for objective verification of the process and in the case of metastases of malignant neoplasms – and for their identification.

Endoscopic data in some diseases of the pleura

In tuberculosis of the pleura, the main changes are usually found on the parietal leaf. The earlier thoracoscopy is performed since the manifestation, the fewer changes are detected. In general, this pleural leaf is swollen, slightly and evenly hyperemic, waxy, intercostal spaces, and vessels are not seen. As a rule, on the posterior paravertebral surface, less often - on the outer rash up to 1–1.5 mm in diameter of the correct shape,

the same size, with a flat surface, giving the impression of a «starry sky»; less often rashes reach 2–4 mm, but their size always remains the same; less often «additional inclusions» are identified in the depth of the parietal leaf, which resembles impregnations in amber or a crisis on the lake. If thoracoscopy is performed late, after eight weeks from the time of manifestation of the disease, different formations, in addition to fibrin layers and various types of membranes, may not be detected.

At primary new growths, the last is based most often in back-lower departments. They have sizes from 2 cm to 20 cm and more. Color – from light white to dark brown. Surface – irregularly shaped, hilly. The surrounding pleura is significantly injected. Other areas of the pleura are virtually unchanged.

With secondary neoplasms on a significantly injected parietal pleura, a large number of tuberculous rashes with a diameter of 2–4 cm can be more extensive and more minor, but always of different sizes. Pleural leaves without edema, but significantly hyperemic, with an injection of arterial vessels resembling acute conjunctivitis.

In cardiac hydrothorax, the pleural leaves are not altered but are significantly enlarged, and the intercostal vessels, especially the veins, are dilated.

In early nonspecific and infectious pleurisy, the parietal leaf is significantly hyperemic, slightly injected, with minor layers. In infectious or non-

infectious pleurisy of the late-stage on the background of hyperemic pleura purulent-fibrin «deposits» – layers.

In traumatic pleurisy – some areas of redness, bleeding, cracks of the pleura, and sometimes protrusion of broken ends of the ribs, with fibrin layers around them, areas of «coagulation» of blood covered with fibrin, when pressed or destroyed light fluid is released – serum.

In systemic necrotic vasculitis (nodular periarteritis, Wegener's granulomatosis, micropolyarteritis) on a slightly swollen parietal pleura, avascular injection – «conjunctivitis» is sharply marked.

In collagenous – on the swollen, as in tuberculosis, parietal pleura – minor rashes, reminiscent of those in tuberculosis (starry sky).

In Meigs syndrome – on a slightly hyperemic pleura «vascular spiders» – «stars».

With a significant number of other pathological processes accompanied by PES, the endoscopic picture is not so characteristic that it can be given in the recommendations for use for differential diagnosis. But even in these cases, visual endoscopic data will be of great benefit if combined with the clinical picture and literature data. The main thing in these cases: «do not miss» tuberculosis and the neoplastic process.

Thus, the etiological diagnosis of PES should consist of the following stages:

– preliminary syndrome diagnosis of pleural effusion, which is realized through the use of physical methods of examination of patients according to table 1: chest examination, palpation, percussion, auscultation;

– probable syndrome diagnosis, which is carried out only by ultrasonoscopy; standard radiography is performed only after the elimination of effusion and thoracoscopy;

– reliable syndrome diagnosis is realized by puncturing the pleural cavity in a typical place or in the area of maximum approximation of the effusion to the chest wall, which is desirable to outline during ultrasonoscopy.

In some cases, when the initial examination of the patient is performed by an experienced doctor who does not doubt the presence of PES, the radiological stage of diagnosis (probable syndrome and diagnosis) performed by ultrasound can be changed by a reliable diagnosis – pleural puncture;

– verification of PES is carried out by thoracoscopy: an endoscopic study of the pleura – pleural biopsy – cytological and histological examination of the biopsy material, microscopy, and bacteriological analysis.

A rational combination of stages of differential diagnosis of the etiology of PES will significantly reduce the verification of effusion and the cost of its implementation and, accordingly, the

treatment of the disease that is accompanied or complicated by PES.

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Електронне навчальне видання

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з дисципліни **«Фтизіатрія»**
для студентів спеціальності *222 «Медицина»*
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