VOLGOGRAD STATE
MEDICAL UNIVERSITY
Department of Pathological Anatomy

Infectious and parasitic diseases. Tuberculosis. Syphilis. Sepsis.

Guidelines for students
III year of medical faculty
for practical exercises in pathological anatomy

Volgograd, 2020

1. **Purpose**: To study the causes, mechanisms of development of tuberculosis. Consider the main clinical and morphological forms of tuberculosis.

2. **Requirements for the level of the student in the development of the discipline - pathological anatomy. The student must be able to:**

1. Terms used on the subject "Infectious process. The principles of classification of infectious diseases.

2. The concept of the main risk factors for the development of the infectious process.

3. The essence and basic laws of the development of the infectious process, its morphological features, damage to cells and tissues, pathogenesis.

4. Give a definition of tuberculosis; outline the etiology and pathogenesis of primary, secondary and hematogenous tuberculosis.

5. To distinguish between the types of clinical and morphological manifestations of tuberculosis according to the macro- and microscopic picture.

6. To analyze the complications and causes of death in tuberculosis.

7. Give a definition of syphilis; outline the etiology and pathogenesis, clinical and morphological manifestations of primary, secondary and tertiary syphilis.

8. Give a definition of syphilis; state the etiology and pathogenesis, clinical and morphological manifestations of sepsis.

Information block on the topic Infectious diseases:

Infection is a biological phenomenon, the essence of which is the introduction into the human body and the multiplication of harmful prokaryotic and eukaryotic organisms in it, followed by the development of various forms of interaction - from asymptomatic carriage of invading agents to severe illness. In practical medicine, the term "infection" refers to an infectious disease, or an infectious process, that is, a complex of pathological changes and reactions to the introduction and reproduction of disease pathogens. Closely related to this is the concept of "infection" (infection) —the ingestion of the causative agent of an infectious disease into cells or tissues of the body. Infection can lead either to the occurrence of an infectious disease or to the carriage of pathogens in the human body (including endocytobiosis) without any signs of the disease. Despite the improvement of living conditions, mortality from infectious diseases remains quite high.

In order to attribute the disease to infections, it is necessary to observe the postulates of the outstanding German bacteriologist Robert Koch (R. Koch, 1843-1910):

• the causative agent of infection should be detected in all cases with this disease, but should not occur in other diseases or in healthy people;

• the pathogen can be isolated or isolated from the patient's body in a pure culture;

• experimental introduction of a pure microbe culture into an organism that is sensitive to this pathogen causes this disease in an experimental animal.

When characterizing the pathogen, its virulence is taken into account - a measure of the pathogenic ™ pathogen ™ in relation to a given organism, which includes infectivity (ability to penetrate into the body), invasiveness (ability to spread in the organism) and toxicity.

Parasites are any organisms belonging either to prokaryotes or eukaryotes, i.e. viruses, microbes, protozoa, fungi, helminths, etc. that use another organism as a habitat and (or) a food source (in particular, the human body), causing harm in most cases. In such a broad interpretation, the concepts of "parasite" and "pathogen" are almost equal. Parasites (pathogens) are obligate (able to exist, or parasitize, only being in another organism) and optional, that is, capable of existing both inside the body (including inside its cells) and outside it. In practical medicine, the term "parasite" often refers only to eukaryotic organisms, considered separately from viruses and bacteria. They are involved in parasitology, which studies parasitic diseases caused by unicellular and multicellular eukaryotes. There are

endoparasites living inside the cavities, tissues and cells of the macroorganism, and ectoparasites living on the surface of the body.

Infection mechanisms

The first and most difficult to overcome barriers to infections are healthy skin, mucous membranes and their secretory-excretory products. For some pathogenic pathogens, lysozyme is secreted, secreted by the lacrimal glands and cleaving peptidoglycans of bacterial walls, as well as acidic gastric juice. Skin infections in healthy people are more likely to occur at the site of injury - wound, burn, surgical - and can be caused by resident microflora (resident - permanent resident), which has a relatively low virulence. At the same time, agents that penetrate the respiratory, digestive and genitourinary tract, initially have sufficient virulence to cause damage and even to overcome barriers in the form of intact mucous membranes.

So, the place of primary introduction of infectious agents, in other words, the entrance gates of the infection are the mucous membranes and skin. Often, in the area of the entrance gate, pathological changes develop that have the characteristic features of the infectious process - the primary affect is formed. Sometimes the entrance gate and primary affect do not match. The localization of primary affect determines the possible pathways of the spread of pathogens throughout the body and even the entire course of the disease. All this makes it necessary to pay special attention to those protective barriers and to those mechanisms of their overcoming by pathogens that act in the area of the gates of infection.

Respiratory tract. Daily, city dwellers inhale an average of about 10,000 micro-beans, including viruses, bacteria and fungi. Alveoli reach only particles of 5 microns or less. They are attacked and, as a rule, absorbed by alveolar macrophages or neutrophils, attracted by cytokines. This purification system is normally quite effective, but its role can be reduced by smoking, secretion of a viscous substrate with hereditary cystic fibrosis, aspiration of gastric contents and traumatic intubation. It also "weakens" with viral infections. Some viruses of the respiratory group (for example, influenza pathogens) possess hemagglutinins, which attach carbohydrates to the surface of the epithelium and thereby prevent mucociliary clearance, that is, cleansing with mucus and cilia. Bacteria are found (from the hemophilic, pertussis, and pertussis groups) that produce toxins that paralyze the activity of epithelial cilia. Tubercle bacillus settles in the alveoli due to its resistance to the killer action of inactive macrophages.

Gastrointestinal tract. Most pathogens enter the digestive tube with food or drink. Prevention: sanitary destruction from dumps and parasites, the fight against flies, washing hands, using clean water and well-boiled food. Natural barriers to the entry of intestinal pathogens include the acidic part of the gastric juice, a viscous layer of mucus covering the intestinal surface, the lysing effect of pancreatic enzymes, and the release of lgA antibodies. In addition, pathogens must compete for nutrient uptake with copious coexisting autoflora (resident bacteria). The protective properties of the digestive tube are reduced with a small acidity of the gastric juice, taking antibiotics that alter the balance of the normal intestinal autoflora, with impaired motility or mechanical obstruction of the intestine. Most enveloped viruses die by digestive juices, however, devoid of envelope viruses can be resistant (e.g., hepatitis A virus, rotaviruses, Norwok virus and reoviruses). Rotaviruses directly damage intestinal epithelial cells infected with them, while reoviruses pass through M cells of the intestinal mucosa and enter the bloodstream without damaging any cells.

Enteropathogenic bacteria affect the gastrointestinal tract in various ways. Growing on contaminated foods, certain strains of staphylococci release strong enterotoxins (exotoxins) that cause food poisoning without signs of pathogen reproduction in the gut. Vibrio cholerae and toxigenic Escherichia coli multiply in the mucus covering the intestinal epithelium. Their colony-like communities release exotoxins, as a result of which the mucous membrane begins to secrete excess fluid, which is clinically manifested by diarrhea. Shigella, Salmonella and Campylobacter, on the contrary, penetrate the mucous membrane and the intestinal mucosa plate, damage them, causing ulceration, hemorrhage and inflammation. The causative agent of typhoid fever, Salmonella typhi, passes a path starting in the damaged mucous membrane of the small intestine, penetrates through group lymphatic follicles (Peyer's patches)

into the lymphatic vessels of the mesentery and mesenteric lymph nodes, and reaches the blood vessels. After the pathogen enters the bloodstream, a systemic infection occurs.

Mycoses of the gastrointestinal tract are found mainly in people with inferior immunity. Candida fungi are prone to parasitism in stratified squamous epithelium and can cause candidal stomatitis (thrush of the oral cavity), membranous esophagitis, as well as affect the stomach, distal intestines and some other internal organs.

Cystic, i.e., shell, forms of intestinal protozoa are resistant to hydrochloric acid of gastric juice. In the intestine, cysts turn into mobile trophozoites (vegetative forms of protozoa) and are attached to sugars on the surface of the intestinal epithelium using lectins. Further events depend on the species of the parasite. Giardia is attached to the brush border of epithelial cells, while cryptosporidia penetrate enterocytes, inside which form gametes and spores. Entamoeba histolytica induces contact-mediated cytolysis, similar to that arising under the influence of cytotoxic T-lymphocytes. Under the influence of a channel-forming protein, pores appear in the shell of the nucleus, depolarization and death of epithelial cells occur, and the pathogen gets the opportunity to penetrate the organ wall.

Intestinal helminths, as a rule, cause the disease either when they accumulate in large numbers (helminth obstruction of the intestine), or when localized in an atypical place (for example, invasion of ascaris in the bile ducts with damage to the latter). The larvae of some worms pass rather quickly through the intestine, without substantially damaging it, and the main changes can be seen in the tissues and internal organs. So, trichinella larvae form the membrane most often in the muscles, and echinococcus larvae in the liver or lungs.

Genitourinary tract. Normal urinary tracts are usually sterile, urine flow contributes to their constant purification and expulsion of pathogens. The mechanisms by which an infection of these pathways develops is discussed in chapter 28.

The skin of a healthy person is populated by various types of bacteria and fungi. These mixed communities are maintained in metabolic equilibrium and suppress the overgrowth of any of the "aliens". The dense outer stratum corneum of the epidermis is periodically desquamated and renewed. Low pH and the presence of fatty acids in normal skin give advantages to resident microorganisms over pathogenic microbes. The formation of communities and the spread of microbes on the wet and warm surfaces of the mucous membranes occur faster than on cool and dry skin. Heating, contamination, high humidity and damage can reduce skin resistance. With significant damage, pathogens penetrate not only the skin, but also the blood. Many pathogens avoid the epidermal barrier, getting into the skin with insect bites. The spectrum of these pathogens varies from viruses (Dengue fever causative agent), Rickettsia (spotted fever pathogens) and bacteria (Lyme disease causative agent) to protozoa (for example, malaria or leishmaniasis causative agent) and even helminths (filariasis causative agents). In some cases, the penetration of the pathogen is facilitated by the action of distribution factors or enzymes contained in the saliva of the insect. Some infectious agents, such as rabies virus, can be transmitted by animal bites and even actively overcome the skin barrier by secretion of proteolytic enzymes (worm larvae with hookworms and schistosomes).

Distribution and dissemination of pathogens

Numerous infectious agents are invasive parasites, i.e. they are able to penetrate into internal tissues due to their own mobility and production of proteolytic enzymes (streptococcal hyaluronidase, schistosomal protease, etc.). Initially, pathogens spread along the surfaces of tissues with low resistance, for example along aponeuroses. Even faster, they settle on the surfaces of the serous cavities (pleura, peritoneum, meninges) or along the peripheral nerves. This is the contact path of infection. From the gates of infection, bacteria through the lymphatic pathways can enter the regional lymph nodes. This is a lymphogenous pathway. At the same time, first the vessels are sequentially involved in the inflammatory process (lymphangitis occurs), and then the lymph nodes (lymphadenitis develops). The combination of primary affect with lymphangitis and regional lymphadenitis is called the primary complex (primary infectious complex).

From the lymph nodes, microbes enter the blood vessels, giving rise to a hematogenous pathway for the spread of infection. For example, untreated staphylococcal infection from a localized small abscess (boil) in the area of the entrance gate can form the primary complex. Further, bacteremia and

more severe manifestations are possible: endocarditis and multiple abscesses in the kidneys, brain and other organs. Septicopyemia develops - a form of sepsis in which metastatic abscesses occur in different organs as a result of microbial embolism (for sepsis, see chapter 22). In the hematogenous pathway, depending on the type of pathogen, distant foci of inflammation, for example abscesses or granulomas, are formed again. They are single and multiple or large and small, having the size of millet grains. Such are the foci in miliary tuberculosis or microabscesses in candidiasis.

Viruses can spread from cell to cell by fusion of the latter or by axon transport (poliovirus). They are also able to penetrate the bloodstream and move with the help of either vagrant macrophages (HIV-1) or red blood cells (the causative agent of tick-borne Colorado fever).

Thus, in some cases, the most important signs of the infection process are formed and appear in areas remote from the gates of infection. So, measles and chickenpox viruses enter the body through the respiratory tract, but the first signs of the disease appear in the form of a skin rash.

Penetration into the bloodstream of individual weakly virulent or non-virulent pathogens occurs quite often. Massive penetration into the bloodstream and the spread of pathogenic pathogens, i.e. viremia, bacteremia, circulation in the blood of fungi or parasites, are accompanied by an increase in body temperature, lower blood pressure, hyperplasia of the spleen and bone marrow, and many other systemic and organ symptoms and syndromes. Emerging pathological processes are triggered by a cascade of cytokines and other mediators that are activated by bacterial endotoxins or lysed products of damaged cells. If infectious agents enter the pregnant uterus through the external uterine pharynx or bloodstream, severe fetal lesions may occur. The causative agent of syphilis Treponema pallidum overcomes the placenta at the end of the second trimester of pregnancy and causes the child to develop congenital syphilis.

Tuberculosis:

At the end of XX century. Mycobacterium tuberculosis infected about 30% of the world's population, approximately 3 million patients died every year. The introduction of effective antibiotics into medical practice, a more even geographical distribution of the population, and finally, the widespread prophylactic vaccination of newborns - all this for about 40 years has led to a significant reduction in the incidence of tuberculosis in the most developed countries. In the last decade, an increase in the incidence rate has been observed again in almost all countries of the world. The reasons for this were the emergence of drug-resistant strains and the spread of HIV infection (AIDS patients have reduced resistance to tuberculosis bacillus, suffer from tuberculosis more often and more severely). In Russia, the problem of tuberculosis has regained its former urgency. Only during 1993-1998. the incidence of adult Russian citizens with this disease increased by 42%, and children - by 62%. For every 100,000 people in Russia, 15 die from various forms of tuberculosis.

Etiology and pathogenesis. Two types of the causative agent of tuberculosis are pathogenic for humans: M. tuberculosis and M. bovis (bovine type). Both pathogens are sometimes called Koch sticks.

M. tuberculosis is transmitted by inhalation of small droplets containing the pathogen of saliva secreted by the patient by coughing or sneezing. M. bovis is transmitted through dairy products obtained from diseased cows, and first affects the palatine tonsils and intestines. In industrialized countries, hygienic conditions for livestock, bacteriological control and pasteurization of milk have virtually eliminated M. bovis. Two more types of mycobacteria - M. avium (bird type) and M. intracellulare (intracellular type) - do not show virulence in practically healthy people, but can cause disseminated forms of infection in 15-24% of AIDS patients.

Mycobacteria are optional aerobic, non-spore-forming, immobile microbes with a wax capsule, which ensures the pathogen's resistance to acids and perceives Tsilya's red carbolic fuchsin. In order to identify the carrier of the pathogen, but not an active infection, the Pirke test is traditionally used (the area of local skin hyperemia is measured, i.e., the severity of HRT reaction in response to applying tuberculin to an artificially damaged skin area) and the Mantoux test (the reaction is evaluated after intradermal administration of tuberculin) Instead of tuberculin, which used to be a concentrated water-glycerin extract of a mycobacterial culture, purified M. tuberculosis protein derivative (PPD) is currently used.

In adults who first became ill with tuberculosis, one can find not only the classic forms of Koch's bacillus, but also altered variants in the form of L-forms and very small micrococcal forms.

There are three major aspects in the pathogenesis of tuberculosis: maintaining the pathogen virulence, the relationship between hypersensitivity and anti-tuberculosis immunity, the pathogenesis of specific tissue damage and the development of cheesy (caseous) necrosis.

Koch's rods still have not revealed any endotoxins, exotoxins, or "histolytic" enzymes. Their pathogenic effect is mainly associated with the ability to avoid the harmful effects of macrophages and cause HRT reactions. This is ensured by 5 components of the cell wall of tubercle bacillus, which include the cord factor; sulfatides; macrophage activation inhibitory factor (LAM); heat shock protein with a molecular weight of 65 kD; complement activated on the surface of mycobacteria (able to opsonize pathogens and facilitate their absorption with the help of macrophage complement receptor CR3).

The development of cell-mediated type IV hypersensitivity (see chapter 7) to the causative agent of tuberculosis, possibly explains its destruction in the tissues, as well as the emergence of resistance to it. At the very beginning of the initial penetration of Koch rods into tissues, the inflammatory reaction is not specific and resembles a reaction to any form of bacterial invasion. However, within 2-3 weeks, the inflammatory reaction acquires a granulomatous nature. Then, the central zones of granulomas are subjected to curdled (caseous) necrosis and typical granulomas (tuberculous tubercles) are formed.

The developed tuberculous tubercle contains in the center a rounded zone of curdled necrosis. The names "curd" and "caseous" appeared due to the appearance of grayish-white, oily and tiny necrotic masses. Around the necrosis are activated and transformed macrophages, known as epithelioid cells. They form a circular layer of various thicknesses. Among them, there are giant multinucleated Pirogov – Lang-hans cells resulting from the fusion of epithelioid cells. Some researchers found in the cytoplasm of epithelioid and giant cells Koch's rods, staining them according to Ziehl-Nielsen or fluorochrome auramine.

Primary pulmonary tuberculosis.

Primary pulmonary tuberculosis begins after aspiration or ingestion of a tubercle bacillus, and can end in different ways. For the first time, the stick enters the human body in childhood, less often in adolescence. The result is a primary affect, that is, a lesion of primary damage, a small tubercle or a larger lesion of caseous necrosis, which is most often located under the pleura in the right lung, in well-aerated segments - III, VIII, IX and X. The lesion may occupy either several alveoli, or the acinus, lobule, and even a segment. In children with developed anti-tuberculosis immunity, the process ends in recovery: activated macrophages gradually destroy the phagocytosed pathogen, and a scar or petrificate is formed in the primary affect zone - a site inlaid with calcium salts. This site can have different sizes, but rarely exceeds the diameter of a pea; it is called the center of Gon. It can serve as a receptacle for an inactive pathogen in carriers of infection. Over time, progressive forms of primary tuberculosis or secondary tuberculosis can develop from it.

In children with weak tuberculosis immunity, less activated macrophages are not able to cope with mycobacteria in the primary affect zone, the process progresses and leads to the formation of the most characteristic manifestation of primary tuberculosis - the primary tuberculosis complex. This complex for tuberculosis is a variant of the primary infectious complex and consists of primary affect (Gon's focus), tuberculous lymphangitis and lymphadenitis (the focus of caseous necrosis in one of the regional lymph nodes). After a few weeks, T-lymphocyte-mediated immunity develops, which can be determined by positive skin tests. The primary tuberculosis complex heals.

Mycobacteria activated T lymphocytes interact with macrophages in two ways. First, CD4 + T-helpers secrete INFs, which activate macrophages and determine their ability to destroy the pathogen with the help of intermediate nitrogen compounds (NO, NO2, and HNO3). At this stage, epithelioid granulomas are formed and the pathogen is cleansed. Secondly, CD8 + T-suppressors destroy macrophages containing Koch bacilli, leading to the formation of developed tubercles with caseous necrosis, which reflects the HRT reaction. Necrosis can also be the result of direct toxic effects of the pathogen on macrophages. The causative agent can no longer multiply in an acidified environment, outside the cells, without oxygen, and thus the infection falls under the control of the body's immune responses. Those areas of the primary complex where cheesy necrosis has developed undergo fibrosis and petrifi-

cation. This is how the Gon complex is formed (petrified in place of primary affect, petrified in the lymph node, fibrosis along lymphangitis).

With the progression of primary tuberculosis, the pathogen can spread through the body in 4 ways - contact, hematogenous, lymphogenous and through the anatomical channels. Progressive primary tuberculosis manifests itself in 6 main forms, due to one way or another of the spread of the pathogen. The increase and caseification of primary affect as a result of the contact path of distribution sometimes captures the lobe of the lung. Partial removal of the curd mass and the formation of a sharp cavity may occur; extensive caseous pneumonia often ends in death from "transient consumption" (before the era of antibiotics, tuberculosis was called consumption).

Canalicular and hematogenous spread are expressed in 3 forms: rapidly developing large focal pulmonary lesions (with caseous necrosis), miliary tuberculosis (with generalization of the process and the appearance of prosovidnyh foci in the lungs and other organs) and basilar leptomeningitis (damage to the soft meninges). Acute tuberculous sepsis in combination with meningitis is very rarely observed. Lymphogenous spread leads to the involvement of bifurcation, paratracheal, cervical and other groups of lymph nodes. An increase in the affected cervical lymph nodes, leading to a thickening of the neck, is called scrofula (from Latin scrofa - pig, scrofula - mumps).

Hematogenous tuberculosis.

Hematogenous tuberculosis develops from foci of dormant infection, which is either in the not quite healed Gon complex, or in foci of hematogenous screenings during the progression of primary tuberculosis. This form is characterized by the predominance of a productive tissue reaction, a tendency to hematogenous generalization, damage to various organs and tissues (generalized tuberculosis, hematogenous tuberculosis with predominant lung damage, hematogenous tuberculosis with predominantly extrapulmonary infections).

The most common variety in this group is extrapulmonary tuberculosis, in which both destructive and productive changes occur. There are several forms of extrapulmonary tuberculosis - osteoarticular tuberculosis, with damage to the brain, urogenital system.

Osteoarticular form of tuberculosis. It includes tuberculous spondylitis, coxitis and drives. Destructive lesions of the vertebral bodies often lead to scoliosis, i.e., curvature of the spine in the form of kyphoscolysis (hump facing posterior) or lordoscoliosis (hump facing forward). Mycobacteria getting into the hip or knee joint causes the formation in its tissues of merging tuberculous granulomas with caseous necrosis. The affected synovial membrane can form a pannus on the articular cartilage and penetrate the bone along the edges of the joint. The chronic process ends with severe destruction with obliteration of the joint space and fibrous ankylosis, i.e., immobility of the joint as a result of fusion of the articular surfaces.

Tuberculous meningitis or tuberculoma may develop in the brain. Tuberculous meningitis. In almost all cases, the pathogen reaches the subarachnoid space by the hematogenous route during miliary seeding or spread from the tuberculous focus. Tuberculosis bacilli can enter the subarachnoid space from osteoarticular lesions, especially with destructive spondylitis. Clinically, tuberculous meningitis in most cases proceeds in a subacute form. The exudate has a gelatinous or curdled (caseous) appearance and is most determined in the tanks of the base of the brain and around the spinal cord. In the vascular and arachnoid membranes, close to the cortical vascular branches, small (with a diameter of 1-2 mm) whitish tubercles can be found. An obstruction of the cerebrospinal fluid develops, as a result of which hydrocephalus, expressed to one degree or another, almost always occurs. Under a microscope, fibrinous-caseous exudate with a large number of lymphocytes, plasma cells and macrophages is determined. Only occasionally can one meet giant Pirogov-Langhans cells. As a rule, obliterating endarteritis is noted, leading to a significant narrowing of the lumen of the affected arteries, resulting in minor heart attacks or roots of the cranial nerves. In the latter case, focal neurological symptoms develop.

Tuberculoma is an encapsulated focus of caseous necrosis. In adults, tuberculoma is usually found in the cerebral hemispheres, and in children - more often in the cerebellum. A rather wide connective tissue capsule is revealed macro- and microscopically, in the thickness of which ordinary tubercular tubercles with giant Pirogov-Langhans cells are clearly visible. In the masses of caseous necrosis, only occasionally is it possible to detect mycobacteria stained by the Ziehl – Nielsen technique.

Urinary system tuberculosis is most often manifested by interstitial tuberculous nephritis.

Tuberculosis of the reproductive system. In men, as a rule, it begins with the epididymis, after which it can spread to the testis. In most cases, tuberculous prostatitis and vesiculitis (inflammation of the seminal vesicles) develop simultaneously. In women, tuberculous endometritis or adnexitis (inflammation of the uterus) occurs. The morphology of granulomas is quite typical. In both sexes, tuberculosis of the reproductive system leads to infertility.

In addition to these organs, the skin and subcutaneous tissue, endocrine glands are often affected (bilateral damage to the adrenal glands leads to the development of Addison's syndrome), eyes.

With hematogenous (extrapulmonary) tuberculosis, hematogenous lung disease sometimes also develops. In this case, both focal (miliary, large-focal) and cavernous changes occur. Differences between hematogenous lesions and secondary pulmonary tuberculosis are the presence of an extrapulmonary lesion, symmetrical lesions of both lungs, the tendency of pulmonary lesions or caverns to progressive perifocal fibrosis ("stamped caverns"), and the absence of a "number of storeys" of lung lesions. Sometimes in patients with hematogenous tuberculosis, a generalized infection develops, which manifests itself in many organs in the form of miliary or large-focal dissemination, sometimes combined with meningitis.

Secondary pulmonary tuberculosis. As a rule, adults fall ill who have formed in childhood and have healed at least a small tuberculous primary affect, and often a complete primary complex. Secondary tuberculosis occurs either as a result of reinfection of the lungs (reinfection), or when the pathogen is reactivated in old foci that may not give clinical symptoms. The predominantly intracanalicular (through the natural anatomical channels) pathway of the spread of infection and the predominant lung lesion are characteristic. Secondary tuberculosis is also called pulmonary.

In an organism that has already met or is infected with the causative agent of tuberculosis, after an allowable dose of reinfection, active immune reactions in various combinations and HRT reactions can form (see above). These combinations are expressed in various morphological forms of lung tissue damage.

In Russia and some other countries, it is customary to distinguish 8 morphological forms of secondary tuberculosis, some of which can pass one into another and, therefore, are stages of one process.

Acute focal tuberculosis (foci of Abrikosov). The disease is manifested by foci of acinous or lobed caseous pneumonia that develops after a previous lesion of the intralobular bronchus (foci of caseous bronchopneumonia). On the periphery of the foci of necrosis are layers of epithelioid cells, then lymphocytes. Pirogov-Langhans cells are found. One or two foci of Abrikosov arise in the apices, i.e., in the 1st and 2nd segments of the right (less often the left) lung, in the form of focal points of compaction with a diameter of less than 3 cm. Bilateral and symmetrical lesions of the apices with even smaller foci are sometimes observed. When the foci of Abrikosov are healed, petrificates arise - foci of Ashoff-Bullet.

Fibrous-focal tuberculosis. It develops on the basis of healing, i.e., encapsulated and even petrified foci of Abrikosov. Such newly “revived” foci can give rise to new acinous or lobular foci of caseous pneumonia. The combination of healing and exacerbation processes characterizes this form of tuberculosis.

Infiltrative tuberculosis (focus of Assmann-Redeker). This disease is a further stage of the progression of the acute focal form or exacerbation of the fibrotic-focal form. The foci of caseous necrosis are small, around them on a significant area are perifocal cell infiltrate and serous exudate, which sometimes can cover a whole fraction. Specific features, epithelioid and giant Pirogov-Langhans cells, in the infiltrate are not always clearly expressed.

Tuberculoma. This is an encapsulated focus of cheesy necrosis with a diameter of up to 5 cm, located in the I or II segment of the upper lobe of the lung, often on the right.

Caseous pneumonia can be a continuation of the infiltrative form if necrotic processes begin to prevail over the productive ones, and captures the area of the lung from the acinus to the lobe.

Acute cavernous tuberculosis. The disease develops as a result of the rapid formation of a cavity in caseous masses drained through the bronchus with sputum when coughing. The cavity has an irregular shape with a diameter of 2-7 cm, is usually located in the region of the apex of the lung and often

communicates with the lumen of the segmental bronchus. Its inside walls are covered with dirty-gray curd masses, under which there are layers of epithelioid cells with scattered Pirogov – Langhans cells.

Fibrous-cavernous tuberculosis (chronic pulmonary consumption). The disease is characterized by a chronic course, is a continuation of the previous form. The inner layer of the cavity is represented by caseous masses, in the middle layer there are a lot of epithelioid cells, multinuclear giant Pirogov – Langhans cells and lymphocytes, the outer layer is formed by a fibrous capsule. With this form (especially during the period of exacerbation), the "number of storeys" of changes is characteristic: under the cover one can see focal lesions, older in the middle and more recent in the lower parts of the lung. On bronchial tubes with sputum, the process passes to the second lung.

Cirrhotic tuberculosis is characterized by a powerful development of scar tissue not only in the place of the former cavity and in the surrounding tissue. At the same time, lung tissue is deformed, interpleural adhesions appear, as well as bronchiectasis.

Complications of secondary tuberculosis are mainly caused by caverns. Bleeding from damaged large vessels, especially recurring ones, can result in death from posthemorrhagic anemia. Rupture of the cavity and the penetration of its contents into the pleural cavity lead to pneumothorax and pleurisy. Of the other complications, there should be called a sporadic lesion of the intestine (up to the development of ulcers) with constant ingestion of infected sputum (sputum - sputum). With a long wave-like course of secondary pulmonary tuberculosis, secondary amyloidosis may develop. The latter is especially often observed with a fibro-cavernous form and sometimes leads to death from chronic renal failure.

SYPHILIS

Syphilis (luez) is a chronic infectious sexually transmitted disease with polymorphic lesions and a sequential change in the stages (periods) of the disease. The causative agent of si-filis is a pale spirochete (Treponema pallidum) - an anaerobic microorganism. The presence of the L-forms of the pathogen has been established, with which seroresistance is associated. Infection occurs through sexual and non-sexual (household, professional) ways. Perhaps intrauterine infection of the fetus.

Pathological anatomy.

Changes in syphilis are determined by the period of the disease.

The primary period (up to 7 weeks after a two-week incubation period) is characterized by a syphilitic, or solid, chancre in the area of the entrance gate of infection. Chancre - a compacted rounded nodule or plaque with an erosive surface. Regional lymph nodes are enlarged. A primary syphilitic complex is formed.

The secondary period - the period of generalization of the infection lasts 3-4 years; characterized by the appearance on the skin and mucous membranes of inflammatory rashes - secondary syphilis with exudative and necrobiotic reactions. The main varieties of syphilis: rose¬ola, papules, pustules. Brown spots, areas of baldness (syphilitic alopecia) appear. Possible damage to the central nervous system, bones, joints, eyes, etc. Important lesions of internal organs are hepatitis, nephrosonephritis, syphilitic mesortitis, myocarditis, neurosyphilis.

The Tertiary period is characterized by the presence of foci of productive necrotic inflammation in the form of hillock rashes and gum, as well as interstitial inflammatory changes in the internal organs. Gummy ulcerate, scarring, sometimes calcification. Gummous destructive lesions of the oropharynx in the outcome lead to impaired speech, swallowing, breathing, deform the face (destruction of the nose, perforation of the hard palate).

Congenital syphilis (ICD: A50 Congenital syphilis) is similar to the secondary and tertiary periods of the disease, characterized by a polymorphism of manifestations. They distinguish clinically and anatomically: syphilis of deadly, premature fetuses, early congenital syphilis of newborns and infants, and late congenital syphilis of children of preschool, school age and adults.

Morphological manifestations of syphilis: cell lymphoplasmic infiltration, peri-vascular localization of infiltrates, endarteritis and endoflebitis, with tertiary syphilis - the tuberculoid nature of the infiltrate, caseous necrosis. Differential diagnosis is carried out with tuberculosis. In syphilis, inflammatory cells predominate in inflammatory infiltrate, and giant cells of foreign bodies are also found. The reference

point for diagnosis can serve as obliterative changes in blood vessels (except for packed erythema). In clinical diagnosis, the leading methods are the detection of pale spirochetes in the separated chancre and serological reactions.

3. Lesson plan

To study the following macropreparations, to describe them according to the scheme for the description of macropreparations.

Macropreparations.

1. Primary tuberculosis complex. To study the morphological manifestations of primary tuberculosis according to a macroscopic picture. Describe the primary preparation tuberculosis complex macrodrug. Pay attention to the localization, size, color, consistency of primary affect, adjacent to the site of pleura; size, color, consistency of the bronchial lymph node; size and color of foci along the outflow of lymph from the subpleural och-ha.

2. **Tuberculosis of the lymph nodes**. Examine the lymph node tuberculosis using a macroscopic picture. Describe the "Lymph node tuberculosis" macrodrug. Pay attention to the localization, size, color, consistency of the lymph nodes, features of the view in the section.

3. **Miliary tuberculosis of the lungs**. To study miliary pulmonary tuberculosis according to a macroscopic picture. Describe macropreparation "Miliary pulmonary tuberculosis". Pay attention to localization, quantity, size, color, texture, shape of foci; lightness and texture of lung tissue.

4. **Tuberculous spondylitis**. To study tuberculous spondylitis by a macroscopic picture. Describe the tuberculous spondylitis macrodrug. Pay attention to spinal deformity, condition of vertebral bodies and intervertebral discs; localization, shape and color of the contents of the cavity.

5. **Petrificates in the lung**. To study the petrification in the lung by a macroscopic picture. Describe macropreparation "Petrificates in the lung". Pay attention to the localization, quantity, shape, texture and color of the foci.

6. **Caseous pneumonia**. To study caseous pneumonia by a macroscopic picture. Describe macropreparation "Caseous pneumonia". Pay attention to the localization and volume of the lesion, the condition of the pleura; the consistency and color of lung tissue in and around the lesion.

7. **Fibrous-cavernous pulmonary tuberculosis**. To study fibro-cavernous pulmonary tuberculosis according to a macroscopic picture. Describe the macrodrug "Fibrous-cavernous pulmonary tuberculosis." Pay attention to the localization, size, shape, thickness, density and inner surface of the cavity walls, the state of the vessels and bronchi in the cavity of the cavity; spectrum of damage to lung tissue outside the cavity.

8. **Syphilitic mesortitis**. To study syphilitic mesortitis according to a macroscopic picture. Describe macropreparation Syphilitic Mesaortitis. Pay attention to the nature of pathological changes in aortic intima, lumen expansion and color changes.

9. **Septic endometritis**. Examine septic endometritis by macroscopic picture. Describe the septic endometritis macrodrug. Pay attention to the size and texture of the uterus, the thickness, texture and color of its mucous membrane.

Examine the following micropreparations, sketch them, indicate and mark the pathological changes with arrows, using the atlas of micropreparations.

Micropreparations.

1. To study the primary tuberculous pulmonary affect according to the microscopic picture. Describe the micropreparation "Primary pulmonary tuberculous affect" (stained with hematoxylin and eosin). Pay attention to the localization, color, size and structure of the focus of necrosis; pleural condition; cellular composition of infiltrate, exudate; condition of the surrounding lung tissue.

2. To study tuberculous lymphadenitis according to the microscopic picture. Describe the microdrug "Lymph node tuberculosis" (hematoxylin and eosin staining). Pay attention to the localization and

structure of foci of necrosis, the cellular composition of the peripheral zone of granulomas; lymph node tissue condition.

3. To study the healed pulmonary affect (Gon's focus) according to the microscopic picture. Describe the micropreparation "Healed primary pulmonary affect" (stained with hematoxylin and eosin). Pay attention to the localization, color, size, structure of the focus of necrosis; co-single-tissue capsule with foci of hematopoiesis and bone beams; color and localization of calcium salts and coal pigment; condition of the surrounding lung tissue.

4. To study miliary pulmonary tuberculosis according to the microscopic picture. Describe the micro preparation “Miliary pulmonary tuberculosis” (hematoxylin and eosin staining). Pay attention to the localization, quantity, size, structure (type of necrosis in the center, cellular composition on the periphery, vascularization) of tuberculous granulomas; condition of the surrounding lung tissue.

5. To study tubal tuberculosis according to the microscopic picture. Describe the micro-drug "tubal tuberculosis" (hematoxylin and eosin staining). Pay attention to the lumen and thickness of the tube wall, localization, quantity, structure (type of necrosis in the center, peripheral cell composition, vascularization) of tuberculous granulomas; condition of the mucous membrane of the fallopian tube.

6. To study fibro-focal pulmonary tuberculosis according to the microscopic picture. Describe the micropreparation "Focal Focal Pulmonary Tuberculosis" (hematoxylin and eosin staining). Pay attention to the localization, size, structure of the foci of caseous necrosis, granulomas, petrificates; connective tissue capsule; localization and color of calcium salts and coal pigment; condition of the surrounding lung tissue.

7. To study the wall of the cavity with fibro-cavernous tuberculosis according to the microscopic picture. Describe the micropreparation "Cavern wall in case of fibro-cavernous tuberculosis" (hematoxylin and eosin staining). Pay attention to the structure and cellular composition of the inner, middle and outer layers of the wall of the cavity with fibro-cavernous tuberculosis.

8. To study syphilitic mesortitis on a microscopic picture. Describe the micro-drug Syphilitic Mesaortitis. Pay attention to the nature of pathological changes in the middle aortic membrane, lymphoid infiltrates that destroy elastic fibers.

Solve the following situational tasks using the tutorial.

Situational task on the topic Infectious diseases. Tuberculosis.

A 60-year-old man suffered from fibro-cavernous pulmonary tuberculosis for a long time, complicated by pleural empyema. Over the past year, renal inaccuracy has appeared and increased. Died of massive pulmonary hemorrhage. What is the clinical and morphological form of tuberculosis in a patient:

a) primary
b) hematogenous,
c) secondary.

Answer the following questions of the current test control.

1. Methods for the detection of infectious agents in smears and tissues.

a) staining with picrofuxin,
b) Gram method,
c) staining with aniline dyes,
d) the Ziehl – Nielsen method,
e) polymerase chain reaction.

Choose one correct answer

2. The causative agent of tuberculosis:

a) Mycobacterium tuberculosis,
b) Mycobacterium microti,
c) Mycobacterium vaccae,
d) Mycobacterium ulcerans,
e) Mycobacterium leprae.

Choose one correct answer

3. The pathogenic effect of Koch's bacillus is determined by its ability to cause:

a) anaphylaxis reactions,
b) the development of caseous necrosis,
c) purulent inflammation,
d) HRT reactions.

Select all correct answers.

4. Components of the tuberculosis granule:

a) caseous necrosis,
b) plasma cells,
c) epithelioid cells,
g) lymphocytes,
e) vessels with signs of productive vasculitis.

Select all correct answers.

5. Ways of progression of primary tuberculosis:

a) contact
b) hematogenous,
c) lymphogenous,
g) parenteral
e) transplacental.

4. *List of recommended literature:*

Basic literature:

1. "Basic pathology" Vinay Kumar, Ramzi S. Cotran, Stanley L. Robbins, 1997.

Additional literature:

1. "Pathology. Quick Review and MCQs" Harsh Mohan, 2004.
2. "Textbook of Pathology " Harsh Mohan, 2002.
3. "General and Systemic Pathology" Joseph Hunter, 2002.
4. "General and Systematic Pathology " Ed. J.C.E. Underwood – Edinburgh: Churchill Livingstone, 1996 (2^{th}).
5. "Histology for Pathologist" Ed. S.S.Sternberg – Philadelphia: Lippincott Raven Publ, 1997 (2^{th}).
6. "Histopathology. A Color Atlas and Textbook" Damjanov I., McCue P.A. – Baltimore, Philadelphia, London, Paris etc.: Williams and Wilkins, A Waverly Co., 1996.
7. "Muir's Textbook of Pathology" Eds. R.N.M. MacSween, K. Whaley London: ELBS, 1994 (14^{th}).
8. "Pathology" Eds. Rubin, J.L. Farber – Philadelphia: Lippincott Raven Publ, 1998 (3^{th}).
9. "Pathology Illustrated" Govan A.D.T., Macfarlane P.S., Callander R. – Edinburgh: Churchill Livingstone, 1995 (4^{th}).
10. "Robbins Pathologic Basic of Disease" Eds. R.S.Cotran, V.Kumar, T.Collins – Philadelphia, London, Toronto, Montreal, Sydney, Tokyo: W.B.Saunders Co., 1998 (6^{th}).
11. "Wheater's Basic Histopathology. A Color Atlas and Text" Burkitt H.G., Stevens A.J.S.L., Young B. – Edinburgh: Churchill Livingstone, 1996 (3^{th}).
12. "Color Atlas of Anatomical Pathology" Cooke R.A., Steward B. – Edinburgh: Churchill Livingstone, 1995 (10^{th}).
13. "General Pathology " Walter J.B., Talbot I.C. – Edinburgh: Churchill Livingstone, 1996 (7^{th}).
14. "Concise Pathology" Parakrama Chandrasoma, Glive R. Taylor.
15. "Pathology" Virginia A. LiVolsi, Maria J. Merino, John S. J. Brooks, Scott H. Saul, John E. Tomaszewski, 1994.
16. "Short lectures on pathology" Zagoroulko A., 2002
17. "Robbins pathologic basis of diseases" Cotran R., Kumar V., Collins T.
18. "General pathology" Dr. Fatma Hafez, 1979.
19. "Anderson's Pathology " Damjanov I., Linder J. – St. Louis: Mosby Inc., 1995 (10^{th}).

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