Federal State Budgetary Educational Institution of Higher Education "North Ossetian State Medical Academy" of the Ministry of Health Russian Federation

DEPARTMENT OF INFECTIOUS DISEASES

EPIDEMIOLOGY AND PREVENTION OF DIPHTHERIA.

Toolkit
for students of the 5th year of medical, pediatric faculties and 4 courses of the Faculty of Dentistry.

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2023

The teaching aid was approved at a meeting of the TsKUMS FGBOU VO SOGMA of the Ministry of Health of Russia dated 23.05.2023 (minutes №5)

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DIPHTHERIA

Diphtheria was known in the ancient and medieval periods. The modern period of studying this disease began in the 19th century, when the French doctors Bretonno and Trousseau gave a description of the disease and proposed a modern name. In the middle and second half of the XIX century. in different countries, including Russia, there were severe epidemics of diphtheria. The causative agent was discovered by Klebs and Leffler in 1884. On the basis of this discovery, at the end of the last century, antidiphtheria serum was obtained for the treatment of diphtheria, which significantly reduced mortality and mortality. In the 20s. 20th century Ramon suggested inoculations with toxoid to create active immunity. Immunization has dramatically reduced the incidence of diphtheria. Currently, the incidence of diphtheria is reduced to isolated cases; in some areas, for a number of years, clinically pronounced diseases have not been recorded. However, since the wide coverage of the population with toxoid vaccinations does not exclude toxigenic carriage, the infection continues to be relevant. Single diseases and even small outbreaks of diphtheria in recent years have been the result of a weakening of attention to the vaccination prevention of this disease.

Exciter characteristic

The causative agent is Corynebacterium diphtheriae (Diphtheria bacillus, Leffler's bacillus), represented by thin, slightly curved or straight sticks measuring 1-12×0.3−0.8 μm. Often they are thickened at the ends and resemble a mace (from the Greek "sorupe", mace-va). Diphtheria bacillus is characterized by pronounced polymorphism. Corynebacterium diphtheriae - toxic, immobile bacillus, does not form spores, aerobe or facultative anaerobe.

Along with the typical forms of diphtheria bacillus, one can find dwarf, coccoid, thick with bulb-shaped thickening at the ends, giant, wedge-shaped, filamentous, branching and other forms. On the surface of the diphtheria bacillus there are fimbria, which facilitate adhesion to the epithelium of the mucous membrane.

Corynebacterium diphtheriae has three biovars: gravis, mitis, and intermedium.

Bacting biovar diphtheria gravis– short, irregularly shaped, with a small amount of metachromatic granules.

Biovar diphtheria mitisforms long curved polymorphic rods containing many volutin grains (Babes-Ernst bodies).

Bacteria biovar diphtheria inmtermediusnthe largest, with barrel-shaped outlines; they are characterized by transverse partitions dividing the cell into several segments. Currently, the biovar of diphtheria intermedius is classified in the gravis group.

Corynebacterium diphtheriaestains well with basic aniline dyes, gram-positive (staining is not always uniform). For staining smears, alkaline methylene blue according to Loeffler is usually used or they are stained according to Nice-sulfur. Bacteria are able to form L- and filterable forms. In smears, C. diphtheriae are arranged in the form of "spread fingers", "hieroglyphs", "parquet", Latin letters V, Y, L, etc.

Corynebacteria produce a significant amount of various proteins and enzymes into the external environment. The most important of them is diphtheria exotoxin, which plays a leading role in the pathogenesis of diphtheria. Only lysogenic strains of Corynebacterium diphtheriae infected with a bacteriophage carrying the tox gene encoding the structure of the toxin have the ability to produce toxin. Non-toxigenic strains do not cause disease.

Dyphtheria bacteria are significantly stable in the external environment. In a diphtheria film, in droplets of saliva, on door handles, children's toys, they remain for up to 15 days. In water and milk, they survive for 6–20 days. Direct sunlight and high temperatures are unfavorable for them. When boiled, they die within 1 minute, in a 10% hydrogen peroxide solution - after 3 minutes, in a 1% sublimate solution - after 1 minute. Diphtheria corynebacteria are sensitive to the action of many antibiotics: penicillin, erythromycin, tetracycline, rifampicin. However, in the nasopharynx of patients and carriers, despite antibiotic treatment, diphtheria bacteria can persist for a long time [1].

Antigens. In Corynebacterium diphtheriae, O- and K-antigens (AG) are isolated. The lipid and polysaccharide thermolabile fractions of the O antigen (AG) of corynebacteria are predominantly represented by interspecies antigens (AG).

Surface thermolabile K-antigens (AGs) (nucleoproteins, proteins) provide species specificity and show pronounced immunogenicity. With the help of anti-K-sera diphthe-

riinse bacteria are divided into serological variants (about 58). Biovar mitis includes 40 serovars, gravis - 14, intermedius - 4. In domestic practice, diagnostic agglutinating, non-adsorbed sera are used; including polygroup and to serovars for agglutination reaction (RA) on glass and in test tubes [1].

Epidemiology

Diphtheria is a ubiquitous infection. Now, when the incidence has been reduced to a minimum, the seasonal rise is not pronounced, but sporadic cases of infection are more common in the cold season. In countries with well-established active immunization, the periodicity has disappeared - rises in incidence every 6-9 years. Changes in the level of immunity in different age groups of the population under the influence of active immunization led to a shift in the maximum incidence to older age groups.

DiPhtheria - anthroponosis, although there are cases when the pathogen was found in some domestic animals. Sources of infection are patients and some categories of carriers. In some cases, the pathogen is released during the incubation period. The role of the patient as a source of infection is determined by the localization of the process. Patients with diphtheria of the pharynx and nose are more dangerous than patients with diphtheria of the conjunctiva, since in the first cases the pathogen is actively excreted from the body when coughing and sneezing. Patients with mild forms (for example, catarrhal, punctate or insular), due to their mobility, diagnostic difficulties pose a great danger as sources of infection. The source of infection can also be those who have been ill, who sometimes release pathogens after clinical recovery, usually no more than two weeks of convalescence, but sometimes longer. With diphtheria, a "healthy" carriage is often found. It can be both toxigenic and non-toxigenic (that is, the carriage of strains that do not produce a toxin). Non-toxigenic carriage is not dangerous. Healthy carriage of toxigenic strains is more often detected in the environment of the patient (contact carriage). The duration of carriage may vary. Use the following classification of carriage: transient (single detection of the pathogen); short-term (up to two weeks); medium duration (from two weeks to one month); behind- Healthy carriage of toxigenic strains is more often detected in the environment of the patient (contact carriage). The duration of carriage may vary. Use the following classification of carriage: transient (single detection of the pathogen); short-term (up to two weeks); medium duration (from two weeks to one month); behind- Healthy carriage of toxigenic strains is more often detected in the environment of the patient (contact carriage). The duration of carriage may vary. Use the following classification of carriage: transient (single detection of the pathogen); short-term (up to two weeks); medium duration (from two weeks to one month); behind-

severe and recurrent (more than one month); chronic (more than six months). Long-term carriage usually occurs in persons suffering from diseases of the nose and throat (tonsillitis, chronic rhinitis, etc.), as well as in persons with reduced resistance. Healthy carriers are the most frequent sources of infection, sick ones are less important.

The main route of transmission of diphtheria is airborne. However, since C. diphteriae is resistant to drying, other ways of transmitting the disease are also possible: air-dust and contact-household (towels, pillows, toys, school stationery), alimentary. At present, due to a sharp decrease in the spread of diphtheria, alimentary infections are practically not found.

Immunity

Newborns have passive maternal immunity, which lasts a short time. In the future, the level of immunity can be formed due to the transfer of a clinically pronounced or asymptomatic infection (as it was in the pre-vaccination period) or as a result of vaccination, which is widely carried out at the present time. Over the years, the age composition of children vaccinated against diphtheria has changed. Initially, vaccination and early revaccination were carried out. This created immunity in the most susceptible children between 1 and 5 years of age. It was this age group in the pre-vaccination period that gave the greatest incidence. Artificial immunity lasts 5-10 years. In this regard, the maximum incidence occurs in children 6-8 years of age. In the future, it turned out to be necessary to vaccinate children 6-7 years old. Similar reasons in the future were the basis for the appointment of vaccinations for 11-12-year-old children, and at present - for adolescents aged 15-16. A sharp decrease in the incidence and toxigenic carriage, which occurred in the 60–70s, led to a decrease in the natural immunization of the population. This made it necessary to develop measures to prevent diphtheria infection not only among adolescents, but also among adults.

Pathogenesis and pathomorphology of diphtheria

The entrance gates of infection are the mucous membranes of the palatine tonsils, nose, pharynx, larynx, genital organs, conjunctiva, damaged skin, where the pathogen multiplies and produces

destroys the toxin. A high level of antitoxic immunity ensures the neutralization of the toxin in the body.

In this case, two options are possible:

a) diphtheria corynebacteria die and the body remains healthy;

b) due to the virulence factors inherent in the pathogen and insufficiency of local immunity, the microorganism survives, multiplies at the site of invasion and leads to the so-called healthy bacteriocarrier.

If there is no antitoxic immunity, the clinical picture of the disease develops. All clinical and morphological signs of the disease are associated with the action of the toxin. The toxin disrupts protein synthesis in cells, acting as a specific inhibitor of aminoacetyl transferase, an enzyme involved in the assembly of polypeptide chains from amino acids. Locally, exotoxin causes coagulation necrosis of the epithelium.

The toxin gradually penetrates deep into the tissues, enters the lymphatic and circulatory systems, leads to local vascular paresis, an increase in the permeability of the wall of small vessels in the lesion. An exudate rich in fibrinogen is formed in the intercellular space. With the participation of thrombokinase of necrotic tissue, fibrinogen is converted into fibrin, as a result of which a fibrinous coating (film) is formed on the surface of the affected integument - a characteristic sign of diphtheria. If the process develops on a mucous membrane covered with a single-layer cylindrical epithelium (larynx, trachea, bronchi), then only the epithelial layer undergoes coagulation necrosis, croupous inflammation develops, in which the formed film is not tightly connected with the underlying tissue and can easily separate from it (sometimes in the form casts). When the process is localized on mucous membranes covered with stratified squamous epithelium (nose, pharynx, epiglottis, external genitalia), diphtheritic inflammation develops when not only the epithelial cover, but also the connective tissue base of the mucous membrane is necrotic. Fibrinous plaque permeates the entire thickness of the mucous membrane, the film adheres tightly to it, the removal of plaque is accompanied by bleeding.

From the local focus, the toxin penetrates deep into the tissues through the lymphatic pathways, causing swelling of the mucous membranes, submucosal tissue, and regional lymph nodes. In toxic forms of the disease, exudate is formed in the intercellular and intermuscular spaces, which leads to swelling of the subcutaneous tissue.

Once in the blood, the toxin affects the circulatory and nervous system, adrenal glands, and kidneys. In the adrenal glands, foci of hemorrhages and destructive changes up to necrosis are detected. Strengthening of the function of the adrenal glands in the first days of the disease is replaced by their hypofunction until the secretory function is almost completely stopped.

The circulatory organs are particularly affected. All forms of diphtheria are characterized by hemodynamic disorders of varying degrees, up to infectious-toxic shock. The deepest changes occur in the myocardium. They are characterized by degenerative degeneration of muscle fibers up to complete myolysis and productive changes in the interstitial tissue. Deep violations of metabolic processes, in particular protein synthesis, lead to cell death with their replacement by connective tissue. Ganglion cells and nerve fibers of the intracardiac (intracardiac) nerve plexuses experience significant degenerative changes. Diphtheria toxin is an acetylcholinesterase inhibitor. Its action on the nervous system leads to the accumulation of acetylcholine, which adversely affects the structures of the central and peripheral nervous system.

In the peripheral nerves and roots of the spinal nerves, multiple toxic parenchymal neuritis develops with the predominant involvement of the myelin and Schwann sheaths in the process, and a mild axonal lesion, which explains the reversibility of the process.

With toxic diphtheria, degenerative changes in the tubules of nephrons are observed with great stability, which are mainly due to the effect of toxins on the epithelium of the tubules. An important role in the pathogenesis of kidney damage is also played by the development of infectious-toxic shock (shock kidney), DIC in the acute period of the disease. In this case, the vessels of the renal glomeruli are predominantly affected. Perhaps the development of acute renal failure. In the pathogenesis of diphtheria croup, in addition to mechanical causes (the formation of a fibrinous film), reflex spasm of the muscles of the larynx, swelling of its mucous membrane, especially under the vocal folds, is essential.

The peculiarity of the clinical course of toxic and hypertoxic forms of diphtheria is explained by nonspecific sensitization
body and massive formation of toxin. A certain role is played by an immunodeficiency state and an inferior function of the endocrine system.

Clinical picture

The classification of diphtheria is based on information about the localization of the local pathological process and its clinical manifestations. In accordance with this, diphtheria of the pharynx, larynx, nose, eyes, genital organs, skin, wounds, etc. is distinguished. Regardless of the location of the pathological process, diphtheria occurs in atypical (catarrhal) or in typical (with membranous raids) forms. Typical diphtheria, in turn, is localized, widespread and toxic. An exception is laryngeal diphtheria, which occurs only in localized or widespread forms. Along with the above, there is a combined diphtheria, which is characterized by the defeat of several anatomically distant organs.

The sporadic incidence of diphtheria in adults in the vast majority of cases (92.0%) is accompanied by damage to the oropharynx (diphtheria of the pharynx) and very rarely - the larynx (1.0%), nose (0.5%), eyes (0.3%) and skin (0.2%). Somewhat more often (7.0%) than diphtheria of the larynx, nose, eyes, skin, there is a combined form of the disease (as a rule, this is diphtheria of the pharynx with diphtheria of another localization).

Diphtheria pharynx. The catarrhal form of the disease is manifested by 1-2 days of subfebrile body temperature, slight soreness in the throat when swallowing, hyperemia of the tonsils, an increase of up to 0.5-1.0 cm in the diameter of the maxillary lymph nodes. The noted changes gradually (within 3-4 days) disappear or progress, and the disease becomes more severe.

Typical forms of pharyngeal diphtheria. Regardless of the severity of the course of the pathological process, typical forms of throat diphtheria are characterized by a number of common features for them. They can have both acute and gradual onset. The duration of fever with them is relatively small (3-5 days). At the same time, the normalization of body temperature is not a sign of an emerging trend towards recovery. The infectious process continues to progress against the background of normal body temperature. Intoxication is characterized mainly by heaviness in the head, lethargy, weakness, drowsiness.

and pale skin. Only toxic diphtheria can be accompanied by chills, headache. The local inflammatory process is accompanied by a relatively unexpressed sore throat when swallowing, soft hyperemia with a bluish tinge of the affected tissues, the presence of membranous plaque on them, and also, in proportion to its area, swelling of the tonsils. Plaque protrudes above the surface of the tissues. In the first 2-3 days of the disease, it is white, and then gray or yellowish-gray, tightly soldered to the tissues and removed with difficulty (it can only be removed with tweezers). Often, a bleeding tissue defect remains at this site. Plaque has the form of a film of dense consistency (not rubbed with solid objects), not able to dissolve in water and sinking when immersed in a vessel with water.

Llocalized diphtheria of the pharynx proceeds in the form of insular and membranous forms of the disease. It is characterized by subfebrile (in the membranous form - higher) body temperature, moderately pronounced symptoms of intoxication (general weakness, heaviness in the head, pallor of the skin), acute tonsillitis, accompanied by a relatively slight sore throat when swallowing, hyperemia (in most cases with congestive bluish tinge) and swelling of the tonsils, the presence of membranous plaques on their surface (in the case of an island form - in the form of islands up to 5 mm in diameter, and in the case of membranous - more extensive sizes). Localized diphtheria within 6-7 days. ends with the disappearance of the main manifestations of the disease or becomes more severe.

Widespread pharyngeal diphtheriamay arise primarily or develop from a localized one. It is accompanied by febrile body temperature, expressed by general weakness, lethargy, pallor of the skin, dry mouth, acute tonsillitis, moderate sore throat when swallowing with congestive cyanotic hyperemia and swelling of the tonsils, palatine arches, uvula, soft palate, the presence of membranous plaque, an increase of up to 3.0 cm in diameter of the maxillary lymph nodes and their relatively small soreness. With a favorable course of the disease, its main manifestations persist for 6–10 days.

Toxic diphtheria of the throat can be primary or develop from a common form of the disease. In the first case, it begins acutely, and in the second - gradually. Toxic diphtheria

always has a severe course. Severe headache, drowsiness, apathy, adynamia, pallor of the skin, dry mouth (in children - repeated vomiting and abdominal pain), high body temperature (39.5-41.0 ° C), sore throat when swallowing, congestive-bluish color hyperemia and pronounced swelling of the tonsils (the tonsils completely cover the pharynx), covered with a coarse membranous coating that spreads to the surrounding tissues of the oropharynx. Mandibular lymph nodes are enlarged to 3.5-4.0 cm in diameter and painful. Around them, there is swelling of the subcutaneous tissue, spreading to other areas of the neck, and sometimes to the chest.

Diphtheria pharynxin the vaccinated. In people who have been vaccinated, pharyngeal diphtheria occurs in a mild (localized) form and is largely atypical. Body temperature rises to subfebrile level. The plaque on the tonsils, although it is membranous in nature, is easily removed and does not leave behind a tissue defect. In some cases, it is not located on the surface of the tonsils, but comes from the lacunae. However, in these cases, the plaque has a dense consistency and does not dissolve in water.

Diphtheria of the pharynx, caused by an infection combined with streptococci, has an acute onset with chills, aching joints, accompanied by severe intoxication (excitation, headache, lack of appetite, flushing of the face), febrile fever, acute tonsillitis with significant (as in angina) pain in throat when swallowing, bright hyperemia of the tissues of the oropharynx, distinct soreness on palpation of the maxillary lymph nodes. Only membranous fibrinous (dense consistency, not sinking in water) plaque on the tonsils clinically distinguishes this form of diphtheria from tonsillitis.

Toxic diphtheria, as a rule, is accompanied by rapid progression of general and local manifestations of the infectious process. It is accompanied by the spread of edema from the tonsils to the soft, hard palate, and often to the tissues of the nasopharynx. Nasal breathing becomes difficult and patients are forced to breathe through the mouth. The voice often takes on a nasal tone. In these cases, plaque on the tonsils is often saturated with blood and becomes brown in color. A classic sign of toxic diphtheria of the throat is swelling of the subcutaneous tissue of the neck. With a subtoxic form of the disease, it is one-sided, and with a toxic form, it is two-sided. With toxic diphtheria of the first degree, it spreads to the middle of the neck, II degree - to the collarbones and III degree - descends to the chest.

cell. As a result, the neck takes on a short and thick appearance. The submandibular fossa disappears, with toxic II degree - supraclavicular, and with toxic III degree - also the subclavian fossa. As a result of swelling of the subcutaneous tissue of the neck, the skin on it acquires a gelatinous consistency (detected by tapping on it with a finger).

Diphtheria of the larynx. The absence of fiber in the larynx limits the resorption of diphtheria toxin and does not contribute to the development of fever and intoxication. In this regard, the disease is characterized by subfebrile body temperature, a slight deterioration in well-being, as well as signs of damage to the respiratory tract, which during the first two days are manifested by a cough with sputum and a change in voice (catarrhal period). In some patients, a loss of voice soon occurs, a cough becomes silent and inhalation becomes difficult - there is a retraction of the pliable places of the chest during inhalation (stenotic period). It lasts from several hours to 1-2 days. and is replaced by an asphyctic period, which is characterized by the addition of excitation, sweating, cyanosis, weakening of breathing, tachycardia, arrhythmia, drowsiness. However, due to the relatively large size of the respiratory opening in adults, it is extremely rare for localized diphtheria to be accompanied by acute respiratory failure. Its occurrence, as a rule, is the result of the spread of the infectious process to the trachea, bronchi, and often to bronchioles (common diphtheria of the larynx).

Nasal diphtheria. The disease occurs against the background of normal or subfebrile body temperature in the absence of intoxication. Initially, only one of the nasal passages is affected. Serous-purulent or bloody-purulent discharge appears from it. Soon the second nasal passage is also affected. On the wings of the nose, areas of weeping and crusting appear. Dry crusts without an inflammatory reaction occur on the cheeks, forehead and chin. With the catarrhal nature of the lesion, rhinoscopy reveals loosening, erosion and bleeding of the nasal mucosa. With a localized form of the disease, membranous raids are visible on the anterior and middle sections of the inferior turbinates. With the spread of nasal diphtheria, the paranasal sinuses are involved in the pathological process. With toxic diphtheria of the nose, swelling of the subcutaneous tissue of the cheeks and neck is observed.

diphtheria eye. The catarrhal form of the disease is characterized by the same symptoms as banal conjunctivitis - moderate
hyperemia and edema of the conjunctiva of the eyelid, a small amount of serous-purulent discharge from the conjunctival sac, as well as the failure of non-specific therapeutic measures. Filmy diphtheria of the eye differs from catarrhal by pronounced swelling of the eyelids, the presence of hard-to-remove grayish-white films on their conjunctiva. Toxic diphtheria of the eye, along with the noted, is also accompanied by edema of the periorbital tissue.

diphtheria wounds. It is characterized by prolonged non-healing of the wound process, hyperemia of the edges of damaged tissues, the presence of dirty gray plaque on them, and dense infiltration of the surrounding skin.

Complications

ABOUTThe particular propensity of diphtheria toxin to damage the kidneys, heart muscle, and nervous system leads to severe complications of great clinical significance.

*Damage to the renal tubules*neaccompanied by significant impairment of renal function. After the end of the febrile period, albuminuria appears, indicating that the patient was subjected to severe toxic effects.

Damage to the heart muscle- a complication that decides the fate of the patient.

RDistinguish early and late lesions of the heart.

Early circulatory and cardiac disorders. In severe cases, and especially in malignant diphtheria, as in many other infections, a malignant syndrome develops: already at the onset of the disease, at the stage of invasion, as a result of significant tachycardia, the stroke and minute volumes decrease and the blood supply to the coronary vessels worsens. The pulse is very frequent, the heart expands, the liver enlarges. In addition to this functional impairment of the peripheral circulation, which, with appropriate treatment, can still be reversible, from the 4th–5th day of illness, one has to reckon with cardiac disorders caused by anatomical changes that can be localized in the conduction system and in the heart muscle. Serial electrocardiographic studies make it possible to follow the development of these changes. Registration of received data contributes to treatment, and the prognosis is determined on the basis of consecutive electrocardiograms. Violation in the conduction system can take various forms (heart block, various rhythm disturbances). Serial electrocardiograms provide accurate information about the development of lesions of the heart muscle or about their dynamics. Often there is a deformation of the QRS complex, a decrease in the S-T interval, a negative P wave, etc.

*Late violations*Vappear after 3-4 weeks. The clinical picture resembles a decompensated heart disease: pallor, shortness of breath, vomiting, lack of appetite, dilatation of the heart, liver enlargement, and increased heart rate are noted. The patient is in mortal danger; sudden death can be caused even by the patient's attempt to sit up in bed.

Damage to the nervous system. The anatomical basis of these disorders are degenerative changes in the ganglion cells of the anterior horns of the spinal cord. Clinically, changes are expressed in paresis or paralysis of peripheral motor nerves. The most common post-diphtheria paralysis is the paralysis of the soft palate, accommodative eye muscles and peripheral muscles, mainly symmetrical paralysis of the muscles of the lower extremities. These paralysis are much more common in malignant diphtheria, but may occur in milder cases of the disease. Complications appear at 3-6 weeks of illness. The earliest is paralysis of the soft palate. The patient is nasal, his speech is slurred. Liquid food flows out through the nose because the nasal cavity is not isolated from the pharyngeal cavity during swallowing. The palatine curtain hangs sluggishly, the tongue is deflected to the side.

With accommodation paralysis, the patient cannot read, sometimes external ophthalmoplegia can also occur at the same time. With peripheral paralysis, damage to the lower extremities is most often observed: the absence of knee and Achilles reflexes; decreased muscle tone of the limbs, their paralysis. In the case of paralysis of the cervical muscles, the patient is unable to raise his head, with paralysis of the muscles of the pharynx, he cannot swallow, nutrition is carried out using a probe. A rare and terrible picture is observed with paralysis of the diaphragmatic respiratory muscles, accompanied by rapid, shallow breathing, shortness of breath, cyanosis, and a strong sense of fear. In this case, only with the help of a respirator can the life of the patient be maintained.

PIn diphtheria paralysis - in contrast to paralysis in poliomyelitis - improvement occurs within 1-2 weeks, recovery proceeds without consequences.

Differential Diagnosis. Diphtheria of the pharynx should be differentiated from confluent follicular angina, peritonsillar abscess, from Plaut's angina - Win - Cent, from monocytic angina, from necrosis of the pharynx with scarlet fever, from agranulocytic angina and angina with leukemia. In differential diagnosis, one must take into account the fact that diphtheria plaque is closely soldered to the tonsils. The above diseases, as a rule, are accompanied by such symptoms that facilitate differential diagnosis, form its basis (for example, a characteristic blood picture or the result of a bacteriological study).

At the slightest doubt, a bacteriological examination should be carried out. Diphtheria croup should be differentiated from influenza pseudocroup, possibly measles laryngitis, and also laryngotracheobronchitis.

Llaboratory diagnosis of diphtheria.The most likely confirmation of the diagnosis of diphtheria is the results of a bacteriological study. The material for this is obtained from the tonsils and nose. If there is plaque, the material is taken from its edges, slightly lifting the film with a swab. With liquid localization of the process, in addition to smears from the affected areas, mucus from the tonsils and nose must be examined. Swabs from the tonsils are done on an empty stomach or 2 hours after eating, without touching the tongue and teeth with a swab. The material must be delivered to the laboratory no later than 3 hours after receipt, where it is inoculated on the surface of a dense medium (blood-tellurite is most often used) in Petri dishes. A preliminary answer about the presence of bacteria suspicious of diphtheria can be obtained after 24-48 hours, and the final - by determining the toxigenicity (gravis or mitis) and the biochemical variant of the isolated corynebacteria - only after 48-96 hours. Direct bacterioscopy of smears stained with aniline dyes is also performed. The result of microscopy is obtained after 30 minutes and is regarded only as preliminary. When corresponding
In a leading clinic, the absence of bacteriological confirmation does not negate the diagnosis of diphtheria.

DFor serological diagnosis, an indirect hemagglutination reaction (RIHA) is used, carried out with the patient's blood serum and corynebacteria antigen. An increase in antibody titer in paired sera obtained before the 7th day of illness (before the administration of therapeutic serum) and after 1–2 weeks is regarded as a positive result. This is a retrospective method. A negative result does not negate the diagnosis of diphtheria. At the onset of the disease, antitoxin is not detected or its amount does not exceed 0.5 AU/ml. Recently, an accelerated method of toxin indication has been introduced - the antibody neutralization test (PHA) for commercial diphtheria antigens (anatoxin diphtheria diagnosticum).

Treatment of diphtheria

Ghospitalization of patients is mandatory. With toxic diphtheria, patients are transported only lying down. Strict bed rest is necessary for 20-25 days, after which, in the absence of complications, the patient is allowed to sit down and gradually expand the motor regimen. In mild forms (localized diphtheria of the pharynx, diphtheria of the nose), the duration of bed rest is reduced to 5-7 days. In the acute period of the disease, liquid or semi-liquid complete food is needed. Treatment should be specific and pathogenetic.

Specific treatment is carried out with highly purified horse hyperimmune serum. To prevent an anaphylactic reaction, serum is administered according to the Bezredka method. First, 0.1 ml diluted 1:100 serum is injected intradermally into the flexor surface of the forearm. If after 20-30 minutes no changes are detected at the injection site or a papule with a diameter of no more than 0.9 cm is formed, the reaction is considered negative and 0.1 ml of undiluted serum is injected subcutaneously, and if there is no reaction, after 30 minutes the entire prescribed dose is intramuscularly.

With toxic diphtheria II−III degree and hypertoxic form, serotherapy is mandatory, under the protection of hormonal drugs, and sometimes anesthesia. In the case of a positive intradermal test or in the presence of an anaphylactic reaction to subcutaneous administration, further serum is administered only according to unconditional indications. First, serum in a 1:100 dilution is injected into the subcutaneous tissue of the shoulder in doses of 0.5; 2; 5 ml sequentially at intervals of 20 minutes. If there is no response to the previous dose, 0.1 ml of undiluted serum is injected subcutaneously. If there is no reaction, after 30 minutes, the entire prescribed dose is administered subcutaneously. In exceptional cases, serum is administered under anesthesia. Antitoxic serum neutralizes only the toxin that circulates in the blood, and does not affect the fixed in the tissues. Therefore, specific treatment should be carried out as early as possible (optimally on the 1-3rd day of illness).

Dserum levels for the first injection and course of treatment are determined by the form of diphtheria.

In case of late (after the second day of illness) initiation of treatment in patients with a common or toxic form, the first dose of serum should be increased by 1/3−1/2. The frequency of administration of serum is also determined by the form of the disease. With localized diphtheria of the pharynx, nose, liquid localization of the process and early serotherapy, one can confine oneself to a single administration of serum. With a delay in the "melting" of the plaque, it is administered again in a day. If diphtheria of the pharynx is widespread, the serum is administered within 2-3 days. (with toxic form - every 12 hours), and then - according to indications. The first dose is 1/3−1/2 course; in the first two days the patient should receive 3/4 of the course dose.

With diphtheria croup, the initial dose of serum is determined by its stages: stage I - 15-20 thousand AU, stage II - 30-40 thousand AU, stage III - 40 thousand AU; after 24 hours this dose is repeated, and in the following days, if necessary, a half dose of serum is administered.

Usually the course of serotherapy lasts no more than 3-4 days. Indications for the abolition of serotherapy is the disappearance or a significant decrease in plaque, swelling of the pharynx and subcutaneous tissue of the neck, with croup - the complete disappearance or reduction of stenotic breathing. If toxic diphtheria is suspected, serum is administered immediately; on a localized form - some waiting is possible until the results of bacterioscopy, ENT examination, etc. are obtained, but subject to constant observation in the hospital; for diphtheria croup - the introduction of serum is mandatory if this diagnosis is not removed after intensive retraction and antispastic therapy for 1-1.5 hours.

To enhance the action of the serum, intramuscular administration once a day of a 25% solution of magnesium sulfate is recommended immediately after the start of serotherapy.

Pathogenetic treatment is aimed at detoxification, restoration of hemodynamics and elimination of adrenal insufficiency. Detoxification therapy involves the introduction of a 10% glucose solution with insulin, protein preparations (10% albumin - 10 ml / kg) and colloidal solutions (rheopolyglucin - 10 ml / kg) in a ratio of 1:1:1. The liquid is injected at the rate of 20−30 ml/kg of weight. Detoxification therapy is combined with the appointment of diuretics (lasix, mannitol) under the control of blood pressure and diuresis.

DTo improve tissue metabolism, cocarboxylase (50-100 mg), 5% ascorbic acid solution (3-5 ml), 1% nicotinic acid solution (1-2 ml), 1% ATP solution (0.3-1 ml) are prescribed. Nicotinic acid also weakens the effect of diphtheria toxin, and ascorbic acid stimulates immunogenesis and the function of the adrenal cortex. Patients with common and toxic forms of diphtheria of the pharynx, diphtheria of the larynx for the purpose of substitution, anti-inflammatory and hyposensitizing treatment are prescribed prednisolone (25 mg/kg) or hydrocortisone (5-10 mg/kg per day) for 5-8 days. In the first 2-3 days, glycocorticosteroids are administered intravenously, then orally. In hypertoxic and hemorrhagic forms, the daily dose of prednisolone is increased to 5–20 mg/kg, respectively, of the degree of shock. If diphtheria proceeds in a toxic form, 0 is prescribed from the first day, 1% solution of strychnine nitrate (0.5-1.5 ml subcutaneously) depending on age for 2-3 weeks or more. Strychnine increases the tone of the central nervous system, stimulates the respiratory and vasomotor centers, tones the skeletal muscles and myocardium, and stimulates redox processes in the myocardium. Cordiamin, corazole are used, which increase the tone of the circulatory organs. In cases of DIC for deagregulation, in addition to rheopolyglucin, antihistamines, vasodilators, trental, xanthinol are prescribed. To obtain an anticoagulant effect, heparin is administered (150-300-400 U / kg per day). Since reopoliglyukin enhances the effect of heparin, with their simultaneous administration, the dose of the latter is reduced by 30-50%. The introduction of protease inhibitors is recommended - trasilol, contrical, Gordox, Antagosan,

Antibacterial therapy is prescribed to influence diphtheria corynebacterium and secondary flora. It is advisable to

change benzylpenicillin, tetracyclines, cephalosporins, erythromycin.

Ltreatment of patients with diphtheria of the larynx. Along with specific treatment, pathogenetic treatment is carried out. The excitement and anxiety of the child increase the stenosis, so it is important to provide a long medication sleep. For this purpose, a 20% solution of sodium oxcbutyrate (50-100 mg / kg), a 0.25% solution of droperidol (0.1-0.15 ml / kg, but not more than 1.5 ml for a child under 2 years old), sibazon (seduxen), etc. Oxygen therapy is provided. In the case of stenosis of the larynx without respiratory insufficiency, retraction therapy gives a good effect - a warm bath (37.5-38.5 ° C) for 5-10 minutes, warm soda drink, mustard plasters, etc. To reduce mucosal edema, hyposensitizing drugs are used (diphenhydramine, pipolfen, tavegil, etc.), decongestants and anti-inflammatory drugs are prescribed locally in aerosols (in the form of inhalations).

Complex treatment also involves the appointment of glucocorticosteroids, in particular prednisolone (2-3 mg/kg per day), which, in addition to anti-inflammatory action, help reduce laryngeal edema, reduce capillary wall permeability and exudation. Half of the daily dose is first administered intravenously or intramuscularly, the rest is given orally. According to the indications, detoxification therapy is carried out. Early prescription of broad-spectrum antibiotics is mandatory. If conservative treatment is ineffective, surgery is indicated.

An indicator for primary intubation (tracheotomy) is a triad of symptoms (according to G. Ivashentsov):

a) paradoxical pulse (inspiratory asystole of Rauchfus); b) Baye's symptom - constant tension of the sternocleidomastoid muscle during inspiration;

c) persistent cyanosis of the lips and face. In the case of localized croup, prolonged nasotracheal intubation with plastic tubes is possible, with widespread descending croup, a tracheostomy is necessary, followed by drainage of the trachea and bronchi.

Treatment for complications. With myocarditis, the optimal duration of the bed rest period ranges from 3-4 weeks. Patients are fed in small portions 5-6 times a day. Assign strychnine (long course); the introduction of a 20% glucose solution with cocarboxylase, ascorbic acid; ATP for two

weeks; calcium pangamate (50-150 mg per day); agents affecting tissue metabolism - anabolic agents (methandrostenolone orally for 1-1.5 months, potassium orotate 10-20 mg / kg per day for 2-3 weeks). In severe and moderate myocarditis, oral and parenteral prednisolone is recommended (at a daily dose of 2 mg / kg for children, 40–60 mg for adults). The introduction of cardiac glycosides is allowed only with manifestations of heart failure without conduction disturbances. The appointment of strophanthin or corglicon requires careful monitoring of the clinic and ECG data. For the prevention of thromboembolic complications, indirect anticoagulants (dicumarin, neodicoumarin or pelentan) are used. The doses of these drugs are selected in such a way as to reduce the prothrombin index and keep it at the level of 40-50%.

Patients with diphtheria polyneuritis are prescribed strychnine, B vitamins, and glycocorticosteroids. In the recovery period, oksazil is used orally for 15–20 days, massage, therapeutic exercises (carefully), diathermy, galvanization, quartz. If the patient has difficulty swallowing and breathing, it is necessary to suck out the mucus from the respiratory tract using an electric suction. With signs of damage to the respiratory muscles, broad-spectrum antibiotics are prescribed in maximum doses to prevent pneumonia. According to the indications of the patient, they are transferred to apparatus breathing in the conditions of the intensive care unit. Based on the action of diphtheria toxin as an inhibitor of acetylcholinesterase, prozerin is prescribed for neurological complications after the extinction of acute manifestations of the disease.

Treatment of carriers of toxigenic corynebacterium diphtheria. With repeated isolation of bacteria, erythromycin, tetracycline antibiotics, and rifampicin are recommended in age-related doses. After a seven-day course, sanitation usually occurs. The main attention is paid to chronic diseases of the nasopharynx. Treatment begins with general strengthening (methyluracil, pentoxyl, aloe, vitamins) and hyposensitizing agents that complement physiotherapy (UHF, UV irradiation, ultrasound). If there are indications, tonsils and adenoids are removed. Sometimes, after the operation, the carrier state quickly stops. The length of stay in the hospital is determined by the severity of diphtheria and the nature of complications. If there are no complications, patients with a localized form can be discharged on the 12th-14th day of illness, a common one - on the 20th-25th (bed rest - 14 days). Patients with subtoxic and toxic grade I form-

we should be on bed rest for 25-30 days, they are discharged on the 30-40th day of illness. With toxic diphtheria II-III degree and severe course of the disease, bed rest lasts 4-6 weeks or more. A prerequisite for the discharge of a patient with any form of diphtheria is a negative result of two control cultures obtained with an interval of 2 days and not earlier than 3 days after the end of the course of antibiotic therapy.

Prevention of diphtheria

MMeasures to combat diphtheria include the impact on all three links of the epidemic process. The immunization of the population is crucial, i.e. building immunity to infection. It is this event that is the main one in the fight against diphtheria. Although measures aimed at the source of infection and the ways of its transmission are significantly inferior in their effectiveness to vaccination prophylaxis, they should be carried out with maximum usefulness.

Measures directed at the source of infection. Patients with diphtheria are subject to hospitalization, they are discharged after clinical recovery and a double negative bacteriological examination.

Given the difficulties in diagnosing modern diphtheria, which often proceeds atypically, diagnostic departments are being created in large cities, where patients with tonsillitis and patients suspected of having diphtheria of another localization are placed. For the purpose of complete and early detection of patients, it is necessary to actively monitor all patients with angina within three days from the onset of the disease. If patients have pathological raids on the tonsils, then a single bacteriological examination is performed before the start of antibiotic treatment. Patients with acute laryngotracheitis and paratonsillar abscess are also subject to early bacteriological examination for diphtheria. Unvaccinated children require special attention. In the hospital, a bacteriological examination is carried out on the day of admission of the patient, and if the result is negative, it is repeated 3 days in a row.

Dithe diagnosis of "tonsillitis with concomitant carriage of toxigenic diphtheria bacteria" should not be established, it is permissible only on the basis of the results of special comprehensive studies of patients

leg. The occurrence of diphtheria-specific complications (myocarditis, paresis of the soft palate, etc.) in people who have had a sore throat is the basis for a retrospective diagnosis of diphtheria. If diphtheria is detected in a given area, then patients with severe tonsillitis, patients with tonsillitis from closed children's institutions, foci of diphtheria are subject to provisional hospitalization. In the focus of diphtheria infection, the disease of angina with overlays is considered as suspicious for diphtheria.

Carriers are identified during the examination of different contingents: according to epidemic indications of diphtheria convalescents before they are admitted to groups; persons who had contact with sources of infection, students of boarding schools, vocational schools, special educational institutions at the beginning of the school year, living in hostels, re-entering orphanages, forest schools, children's psycho-neurological hospitals.

All carriers of toxigenic diphtheria bacilli are hospitalized and sanitized with antibiotics (tetracycline, oletethrin, erythromycin, levomycetin) for 5-7 days. The results are checked by a double bacteriological examination 3 days after the abolition of antibiotics. Since long-term carriage often occurs in persons with chronic pathology of the pharynx and nasopharynx, it is advisable to treat these processes, as well as general strengthening measures.

Carriers of non-toxigenic diphtheria bacilli are not isolated or sanitized. Only their access to groups of weakened and incompletely vaccinated children is limited.

MMeasures to prevent the transmission of infection in the prevention of diphtheria are of limited importance and are reduced to disinfection measures in the foci, reducing crowding, ensuring sufficient ventilation, and protecting food from contamination.

The basis of diphtheria control is active immunization. Currently, several preparations containing diphtheria toxoid are used: purified toxoid adsorbed on aluminum hydroxide (AD-m), it can be combined with tetanus toxoid (ADS-m) and pertussis vaccine (DPT). In addition, AD-m and ADS-m are prepared - preparations with a reduced content of toxoid. These drugs are less reactogenic and make it possible to immunize those individuals who are contraindicated in DPT and DPT vaccinations.

Pvaccinations with DTP vaccine are carried out starting from 3 months of age, simultaneously with vaccination against polio. Vaccination consists of three vaccinations with an interval of 2-11 months. 2 years after the completed vaccination, a revaccination with the DTP vaccine is carried out. Revaccinations at the age of 6, 11, 16 years and every subsequent 10 years are carried out with AD-m and ADS-m.

Some groups of the population (service workers, people living in a hostel, students, teachers and school staff, employees of children's and medical institutions) are given additional vaccinations (single) with AD-m and ADS-m if secondary diseases with lethal outcome. Adults should not be revaccinated more than once every 10 years. In all cases, the drug is administered at a dose of 0.5 ml intramuscularly.

Currently, the number of children with medical contraindications (for example, with allergic altered reactivity) to immunization has increased. Some of the vaccinated temporarily lose their immunity due to previous diseases or for other reasons. Under the condition of the continued circulation of toxigenic strains of the pathogen, this threatens the risk of the appearance of diseases. In this regard, systematic epidemiological surveillance of the epidemic process of diphtheria is necessary. It provides for monitoring the circulation of the pathogen (by identifying patients and carriers and studying the properties of isolated strains) and monitoring the immunological structure of the population (according to documentary data on vaccinations and using the Schick reaction). Schick's reaction is used to assess immunity. The reaction is based on the ability of diphtheria toxin, when administered intradermally, to cause the formation of an infiltrate and the appearance of redness (positive reaction). This reaction occurs in individuals who do not have immunity. If the subject has immunity, i.e. there is an antitoxin in the body, it neutralizes the injected toxin and no inflammatory reaction occurs (negative reaction). In addition to the Shik reaction, RNGA can be used to determine immunity.

Activities in the focus of diphtheria:

1. Hospitalization of patients, as well as toxigenic carriers that excrete pathogens, is mandatory. They are discharged after receiving negative results for the carriage of microbes (with a double examination).

2. Epidemiological examination of the focus.

3. Final disinfection: the dishes are boiled for 15 minutes or poured with 1% chloramine solution; linen and toys are boiled or soaked in a 2% solution of chloramine for 2 hours; bedding and outerwear are processed in a disinfection chamber.

4. Measures for contact persons:

- identification of contact persons at the place of residence, work (children's institution);
- examination to identify erased forms of the disease and bacteriological examination to identify carriers;
- children and staff of children's institutions are not allowed to enter these institutions until a negative test result is obtained;
- observation (thermometry, examination of the pharynx and nose) for 7 days;
- in children aged 4-14 years, immunity is checked if they have not received the Schick reaction within the last year. Persons with a doubtful and positive reaction are given additional vaccinations.

5. When diphtheria appears in children's institutions, children and staff are examined for carriage, children, in addition, using the Shik reaction for subsequent non-immune vaccinations. The group where there was a patient or a carrier is separated until the final disinfection and a negative result of the examination for carriage. If repeated diseases appear in a children's institution, this institution (or individual groups) may be closed for 7 days.

Test tasks

1. FOR DIPHTHERIA
1) source of infection - patients and carriers of toxigenic strains pathogen
2) an additional source of infection - carriers of non-toxigenic pathogen strains
3) susceptibility is universal, independent of the level of antitoxic immunity

2. PROTECTIVE IMMUNITY IN DIPHTHERIA
1) non-sterile
2) anti-toxic
3) type-specific

3. THE MAIN PART OF THE PATHOGENESIS OF DIPHTHERIA IS
1) the action of exotoxin
2) endotoxemia

3) bacteremia

4. IN THE TREATMENT OF RESPIRATORY DIPHTHERIA
1) early administration of antidiphtheria serum is mandatory
2) antibacterial drugs are of primary importance
3) in mild cases, you can limit yourself to the introduction of serum at home

4. TERM OF DISPENSARY SUPERVISION OF RECONVALescentS diphtheria
COMPOSES
1) 1 month
2) 3 months
3) at least 6 months

5. DIPTHTERIA
1) patients and carriers of toxigenic strains of corynebacteria are subject to isolation
2) isolation of carriers of toxigenic strains of corynebacteria is possible at home
3) isolation of carriers of toxigenic strains of corynebacteria is not held

spliterature search

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