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MODERN APPROACHES TO THE ETIOLOGY , PATHOGENESIS AND TREATMENT OF ACARIASIS DISEASE

Annotation: Acariasis is a group of infectious diseases caused by arachnids. Pathognomonic symptoms for invasive pathologies are organ dysfunctions, for external ones – inflammatory phenomena on the skin and appendages. With high sensitization, allergic symptoms come to the fore. Diagnosis is based on detecting the pathogen in various biological materials, determining the level of IgE. Complex treatment is carried out with the use of etiotropic acaricidal drugs, anti-inflammatory and desensitizing drugs, local and symptomatic effects.

Key words: Acariasis, blood, infection.

Acariasis (acarosis) is a heterogeneous set of nosologies, which includes superficial and deep lesions, allergization of the body with the products of pathogens ' vital activity. Reports of the influence of some representatives of domestic ticks on human health have been recorded since 1778, and in 1972 it was suggested that acariasis plays a role in the structure of cases of sudden infant death syndrome, Kawasaki disease. The prevalence is not reliably known due to diagnostic difficulties. It is believed that people aged 36-45 years are more susceptible to the disease, and male patients predominate. Sensitization is detected in 90% of patients with bronchial asthma.

The sources of the disease are a large group of arachnids belonging to various species. The most common lesions are caused by the superfamilies Analgoidea, Glycyphagoidea, and Acaroidea. Ticks often lead a parasitic lifestyle, being on the external integuments of hosts-animals, less often plants, in internal organs. A person usually gets involved by accident. Pathogens of acariasis can be divided into domestic, living inside the human home, and located in the storage areas of grain, dry hay, flour, bulk food.

The ways of infection are diverse, the contact method of infection prevails when using common items of clothing, bed linen and underwear, in cramped living conditions. Ticks get inside by inhalation - by inhaling dust containing pathogens and their waste products. Infection is described when eating contaminated food, water, when introducing parasites into the external auditory canal, in the eyes when bathing in a pond. Genitourinary infection most likely occurs in an ascending way from the mucous membrane of the genitals, urethra, with unprotected sexual intercourse.

The main risk factors are working with animals and plants that are hosts of parasites, immunodeficiency of various nature. According to some studies, up to 4-6% of the Asian population excretes eggs, larvae and mature individuals with feces and urine. Symptoms of acariasis are often detected among representatives of such professions as agricultural workers, grain storage facilities and bread processing plants, trainers, gardeners, zookeepers, the pathology is often found in people living in unsatisfactory social and hygienic conditions.

Pathogenesis

The pathogenesis of systemic manifestations of acariasis is practically unknown. An idea of the pathophysiological mechanisms of tick action on the body can be obtained from the description of the mechanism of pathological properties of the causative agent of widespread superficial acariasis-scabies. Sarcoptes scabiei (scabies pruritus) damages the epithelium of human skin, releasing antigens and epithelial cell processing products in the process of its vital activity, thereby activating the complement system.

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It is believed that the molecule peritrophin, located inside the intestinal walls of the tick, stimulates the activation of the lectin complement pathway. However, on the surface of the insect's body there is a set of serine proteases (SMIPP-Ss) that allow the pathogen to evade the effects of the immune system. These proteins have the ability to bind the complement component C1q, mannose-binding lectin, and properdin and inhibit all three immune response pathways simultaneously. Also, the protective tick protein can indirectly suppress phagocytosis.

Classification

Damage to organs and tissues in acariasis manifests itself in a variety of symptoms. Representatives of arachnids are found both at home and in the wild. Classification of pathology is based on various degrees of parasite invasion, but this process is usually random and non-specific. The manifestations also do not have strict criteria that characterize acariasis, which is why it is difficult to diagnose nosologies.

1. Superficial acariasis. They are caused by temporary ecto-and exoparasites of mammals and birds, which randomly involve humans in the infectious process. They include scabies, demodicosis, and other non-specific symptoms of infestation: itching of the skin, rashes, dermatitis, and conjunctivitis.
2. Deep acariasis. Pathogens enter the internal organs transiently, some are capable of completely anaerobic reproduction. Tick – borne lung infections are more common in East Africa and Korea, intestinal infections in Spain and China, and urinary tract infections in Canada, South Africa, and Romania. In Taiwan and Thailand, ear canal infections are detected.
3. Acariasis allergies. It is estimated that up to 10% of the world's population is sensitized to house mites found in mattresses, pillows, upholstered furniture, granaries, and medicinal herbs. Often, the first signs are bronchial asthma and allergic rhinitis.

Symptoms of acariasis

The incubation period of the infection depends on the type of infestation. Skin symptoms develop 10-24 hours after the introduction of the pathogen; visceral pathologies are detected after a longer stay of ticks in the human body – up to several months. Clinical manifestations depend on the depth of invasion of the parasite, the most frequent localization is the skin. The most common superficial acariasis is demodicosis and scabies.

The main symptoms of glandular acne infection – redness, itching, greasy sheen, and acne - are common in the facial area, sometimes the external ear canal. There is peeling in the area of the eyebrows and eyelashes, less often their loss, puffiness of the eyelids and discharge from the eyes, especially noticeable in the morning. Scabies moves look like whitish lines with a black dot at the beginning, most often found in areas with thin skin: in the interdigital spaces, the penis area, on the inside of the wrists and forearms. Then the lesion spreads to areas of friction and constant contact with clothing.

Anaphylaxis with tick-borne acariasis occurs suddenly, begins with symptoms of a sharp lack of air, numbness of the lips, tongue, transparent copious discharge, nasal congestion. Pulmonary manifestations of acariasis manifest with fever of more than 38.5° C, prolonged dry cough (sometimes paroxysmal), episodes of hemoptysis and pain behind the sternum. Intestinal signs may include prolonged low-grade fever, diffuse abdominal cramps, nausea, vomiting, stool breakdowns, pus and blood in the stool, weight loss, burning around the anal opening.

Symptoms of external ear damage include unbearable itching, a crawling insect sensation, and severe pain. Symptoms of acariasis infection of the reproductive system depend on the gender of the patient. With vaginal acariasis, itching occurs, pain in the lower abdomen and lower back, abundant whitish discharge. Men develop itchy sores and warts on the glans penis, foreskin, and

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scrotum. Urinary tract damage is manifested by frequent painful urination, lumbar pain, periods of body temperature rise above 37.5° C, chills.

Complications

The main complications of acariasis are suppuration, the symptoms of which occur after the addition of secondary bacterial flora. With a long undiagnosed course, invasive acariasis leads to chronic inflammatory pathologies of the urinary and reproductive systems, impaired reproductive functions, contributes to the development of tissue-organ hyperplastic processes, ulcerative-necrotic changes in the gastrointestinal mucosa, bronchial asthma, chronic bronchitis, otitis externa. A possible link between demodicosis and the onset of melanoma symptoms is being actively investigated.

Diagnostics

Timely detection and treatment of acariasis symptoms requires consultation with an infectious disease specialist. Examination by a parasitologist, allergist-immunologist is indicated. It is important to collect epidemiological and labor anamnesis, find out the living conditions. Other specialists are involved for clinical reasons. Reference laboratory and instrumental diagnostic signs of the disease are::

- Physical data. On objective examination, it is possible to detect scratching, papules, vesicles, urticular rashes on the skin, sometimes perianal. Palpation of the abdomen reveals rumbling, diffuse sensitivity, rarely hepatomegaly. Auscultation is followed by hard breathing, dry wheezing, sometimes local weakening of breathing and blunting of percussion sound. A visual assessment of the nature of sputum, feces, and urine is mandatory.
- Laboratory tests. A general blood test has no specific manifestations, with the exception of moderate eosinophilia. Biochemical parameters correspond to the norm; an increase in ALT and AST activity is rarely detected. In the general clinical analysis of urine – leukocyturia, erythrocyturia. Sputum in visceral acariasis contains eosinophilic accumulations. In the vaginal smear, white blood cells are detected, in the coprogram – red blood cells, pus.
- Identification of infectious agents. Proof of acariasis is the detection of ticks in biological fluids (sputum, eye discharge, ear discharge, vaginal secretions, urine) by microscopy. Avidin-biotin system of solid-phase enzyme immunoassay (ABC-ELISA) for identification of pathogens in feces has been developed. A bacteriological examination of the material (seeding) is mandatory.
- Instrumental techniques. Chest radiography in patients with acariasis of the lungs confirms the expansion of the basal zone, strengthening of the pulmonary pattern. Detailed changes are made during the CT scan. Ultrasound of the abdominal cavity often reveals signs of hepatitis, cholecystitis, pyelonephritis, and cystitis. Colonoscopy in the intestinal form can reveal ulcerative-necrotic lesions of the large intestine, duodenitis.

Differential diagnosis is made with a migrating larva with serpiginous passages, fungal skin lesions with characteristic peeling and plaques. Depending on the organ in which the invasion occurred, acariasis is differentiated from pulmonary tuberculosis (the final diagnosis is established only by the results of mycobacteria detection), genital herpes with specific vesicular rashes, schistosomiasis, in the clinic of which hematuria and dysuria predominate; amoebiasis, which occurs with periods of remission and stool resembling "raspberry jelly".

Treatment of acariasis

For the treatment of symptoms of skin forms, isolation of the patient in a hospital is necessary. Careful personal hygiene is important. The place of treatment for systemic acariasis depends on the severity of clinical manifestations, epidemiological grounds for hospitalization. Bed rest is prescribed for a severe course, burdened with a premorbid background. Dietary recommendations depend on the form of infection. Given the allergenicity of tick waste products, potential food allergens should be limited. In the absence of contraindications, it is necessary to increase the use of liquid.

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Conservative therapy

Treatment of acariasis is most studied on the example of superficial forms of the disease (especially scabies and demodicosis). Treatment of visceral acaroses is difficult due to the complexity and lack of vigilance of medical specialists; in the vast majority of cases, local remedies are prescribed. People with sensitive skin, systemic diseases, and various immunodeficiency conditions are indicated for oral, injectable, and infusion medications. Traditional treatment of acariasis consists in the use of:

1. Etiotropic medications. Specialists in the field of modern infectology usually prefer a combination of metronidazole with doxycycline, ornidazole. Known dosage forms prescribed for organ invasions are ivermectin, chloroquine, nystatin, and neomycin. Treatment with locally active ointments with etiotropic agents containing macrolides, benzyl benzoate, is indicated for skin symptoms of acariasis.
2. Pathogenetic agents. An important area of therapy is desensitization of the body, for this purpose, calcium supplements, antihistamines, and less often – systemic glucocorticosteroids are recommended. Anti-inflammatory (NSAIDs) and detoxification medications based on acesol, glucose-salt and succinate-containing solutions are used almost exclusively for organ damage. Local treatment is performed with antipruritic ointments, chatterboxes.
3. Symptomatic therapy. If systemic anaphylaxis occurs, the administration of epinephrine, prednisone, and resuscitation measures are indicated. Dysfunction of the digestive system determines the need for taking enzymatic, antiemetic agents, sorbents, and sometimes proton pump blockers. The addition of a pyogenic infection, especially with pulmonary acariasis, requires the use of antibacterial drugs.

Experimental treatment

In the study of the effectiveness of treatment of acarodermatitis with ornidazole, satisfactory elimination of the pathogen and increased inflammatory response, weakly stopped by antihistamines, were noted. As a result, a combination treatment was proposed – administration of the main recombinant bovine fibroblast growth factor ("bovine" gel) for topical application together with an etiotropic drug, as well as injectable glucocorticosteroid betamethasone intramuscularly.

Local use of pilocarpine gel showed a good acaricidal effect only with prolonged use, which creates a risk of systemic side effects of the drug (muscarinic effect). Some researchers suggest a combination of camphor oil and metronidazole as an antipruritic agent. Ivermectin when taken orally has a pronounced clinical effect on refractory blepharitis, papulo-pustular lesions of the scalp.

Prognosis and prevention

The prognosis for timely detection is favorable. No deaths were recorded. There is currently no vaccine available; the main measures to counteract acariasis infection are early diagnosis, isolation and treatment of patients, deratization and disinsection of pathogen habitats, as well as wild animals imported from endemic areas-exotic birds, cats, elephants, etc. For preventive purposes, wet cleaning is recommended with the treatment of books, carpets, soft toys and other things that are areas where ticks accumulate, and the use of respirators when working in dusty conditions.

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