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VAGINAL MICROBIOCENOSIS AND CERVICAL PATHOLOGY

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Abstract: The vaginal microbiome is an intricate and dynamic microecosystem that constantly undergoes fluctuations during the female menstrual cycle and the woman's entire life. A healthy vaginal microbiome is dominated by *Lactobacillus* which produce various antimicrobial compounds. Bacterial vaginosis (BV) is characterized by the loss or sharp decline in the total number of *Lactobacillus* and a corresponding marked increase in the concentration of anaerobic microbes. BV is a highly prevalent disorder of the vaginal microbiota among women of reproductive age globally.

Keywords: vaginal microbiome, bacterial vaginosis, *Gardnerella vaginalis*, *Lactobacillus*, female health

Introduction

Pathological conditions of the cervix (UC) include, first of all, dysplastic/malignant processes and a number of other benign formations. Human papillomavirus (HPV)– an etiological factor of UC cancer and precancerous conditions of the vulvovaginal epithelium, is detected in 40-60% of women with chronic cervicitis (CC) and impaired vaginal microbiocenosis [1-3]. The virus disrupts the structure of the mucous membrane, making it vulnerable to other pathogens, supports inflammation, induces immune suppression and, as proven, is often combined with other absolute and relative pathogens. Most studies demonstrate an increased relative risk of HPV infection and, consequently, UC dysplasia against the background of recurrent bacterial vaginosis (BV) [4, 5].

However, it should be remembered that the patient's complaints of whiteness and discomfort in the vulva and vagina are not always the result of inflammatory processes. This fact requires a high-quality medical history and an adequate examination in order to make a correct diagnosis.

The facts of abundant physiological secretions must be excluded; the presence or use of foreign bodies in sexual practice, an atrophic process; hormonal disorders, skin and somatic diseases with clinical manifestations in the genital area (scleroatrophic lichen, squamous cell hyperplasia, lichen planus, psoriasis, etc.), especially simple and allergic contact dermatitis (for example, when using latex, soap, perfumes) [6].

The etiological factors causing inflammation of the UC, vagina and vulva can also be classified as follows [6]:

- Infectious lesions of a specific etiology.
- Inflammatory process of nonspecific etiology.
- Mechanical injury.
- Physical impact.
- Chemical effects.
- Reaction to a tumor, malignant neoplasm.
- Inflammation associated with a systemic disease (described, for example, vaginitis with nodose polyarteritis).

The level of the main lesion in inflammatory diseases is determined by the pathogens, and subsequent targeted therapy may vary. Thus, there is a sufficient evidence base in the world that the pathogens that initiate cervicitis in 1/2 of cases are gonococcal or chlamydial factor, therefore, antibacterial agents should include this spectrum of microorganisms. Inflammatory diseases of the upper genital tract in their chronic course may also have symptoms in the vaginal area and UC, but require

special serious therapy. The following vaginal lesions are most often detected: BV – in 22-50% of cases of pathological vaginal discharge, candidal vulvovaginitis – in 17-39%; trichomonas vaginitis – in 4-35% of cases [5, 7, 8].

The nature of the inflammation is determined by the specifics of the pathogen, clinically it can be diffuse and local. Based on the clinical and morphological picture of the disease, acute and chronic cervicitis/vaginitis are distinguished. Morphological features of cervicitis are determined by the severity of pathological changes in the epithelial and stromal components of UC, the nature and duration of the inflammatory process [4, 5].

Due to the similarity of inflammatory changes in the vaginal part of the UC with inflammatory reactions of the vaginal mucosa, some authors call exocervicitis colpitis or vaginitis. Vaginitis often accompanies cervicitis. Chronic cervicitis/vaginitis is especially common, which is detected in every third woman with leukorrhea [6].

Diagnostics

The diagnosis of acute diseases with timely medical treatment is clear and quite simple today. Diagnosis of chronic UC inflammatory processes remains a complex process. For etiological verification, the bacterioscopic method (the most affordable and cheapest), microbiological culture method with the selection of antibacterial agents, serological, polymerase chain reaction are used. In some situations, an amine test for vaginosis, enzyme immunoassay, direct and indirect fluorescence methods, colposcopy, and cytological may be useful [1, 5-7].

The cytological diagnostic method makes it possible to assess the clinical situation and differentiate the inflammatory process from the malignant one. However, if such changes continue to be detected cytologically after anti-inflammatory therapy, a biopsy should be performed from the areas with the most pronounced colposcopic picture of inflammation. A biopsy (if indicated) in acute inflammation should be delayed and performed after the acute process is stopped; in CC, a biopsy is possible [1, 5, 8].

Medical tactics

The doctor's tactics are determined by the etiology of the inflammation and the stage of the process. Usually, additional examination methods are used for the correct diagnosis and therapy with specific drugs is performed, sometimes together with sexual partners. It should be emphasized that the treatment of infectious diseases today should be based on evidence-based medicine using drugs that have proven their clinical effectiveness. In general, treatment regimens in accordance with the recommendations of different medical societies are similar, but they have their own peculiarities [10-13].

CC therapy should be comprehensive, step-by-step, and take into account the possibility of mix infection. Etiotropic treatment based on examination data is considered to be the primary method of CC therapy [10, 14].

A special place is occupied by inflammatory processes against the background of epithelial atrophy, which can mutually complicate both diagnosis and treatment [1], since there is a thin, vulnerable epithelium, an inadequate response to tests, focal and diffuse changes, standard treatment may be ineffective, and hormonal drugs are required [6]. It should also be remembered that the growth of lactobacilli is stimulated by estrogens.

The role of microbiocenosis and methods of its correction

In the process of treating HPV-associated UC lesions occurring against the background of various inflammatory processes, the rehabilitation process – correction of impaired vaginal microbiocenosis - is important. It has been shown that even after successful treatment with antibiotics directed against anaerobes, 15-30% of patients relapse within 3 months, regardless of attempts to treat the patients' sexual partners. A multicenter trial of various treatment regimens for nonspecific bacterial lesions of the vulva and vagina demonstrated comparable efficacy of all drugs used as anti-infective therapy. However, even after that, a significant part of the patients did not stop experiencing symptoms indicating a violation of vaginal biocenosis (increased pH, deficiency of lactobacilli). It is these women who constitute the risk

group for the development of relapse of the disease. According to Alexander Swidsinski et al., after treatment with metronidazole, in 20-30% of cases, relapse occurs 3 months after successful treatment, in 50-70% – within a year, in 80% – within 9 months after treatment [9].

Isolated use of antibacterial or antiseptic therapy not only does not reduce the frequency of dysbiotic disorders, but also, on the contrary, increases the risk of infectious and inflammatory diseases. The reason for this paradox lies in the fact that prescribed drugs exacerbate the existing imbalance of the vaginal biocenosis and thus cause more harm to a woman's health than the absence of such treatment at all. Accordingly, the prevention of infectious and inflammatory diseases as a mandatory stage should include the restoration of the vaginal biocenosis after completing an effective course of anti-infective therapy [14].

Of course, it is important to correct the biocenosis of the vagina and treat concomitant bacterial infections, taking into account the data of microbiological studies. It is noted that after antibacterial therapy, antibiotic resistance and the growth of lactobacilli that do not produce H_2O_2 are often observed. Sometimes, with moderate BV, it is enough to prescribe drugs that create conditions for the restoration of one's own lactoflora in the form of lactobacillus preparations.

Causes of recurrence

The search continues for the causes of recurrent BV and, consequently, other inflammatory diseases of the UC and vagina, which are now considered to be a decrease in the sensitivity of microflora to metronidazole and antibiotics, the formation of bacterial films that increase resistance to standard therapy, the preservation of an alkaline environment in the vagina after treatment (pH>4.5) and a decrease in local immune protection [9, 12, 16]. Maintaining an adequate acidic environment in the vagina is considered as a key factor in reducing the recurrence rate of BV and cervicovaginitis, as numerous studies have shown that while maintaining an alkaline environment in the vagina after treatment, there are no or few lactobacilli, the prevalence of intestinal flora, the presence of multiple epithelial cells, mixed flora, conditions for the reproduction of mycoplasmas, trichomonads, increased the number of white blood cells.

The presence of bacterial films with *Gardnerella vaginalis* is a characteristic feature of BV. They should also be actively destroyed, including for the purpose of more active epithelial renewal in case of persistent HPV infection and the development of dysplastic conditions. Biofilms are destroyed much faster at low pH, and *G. vaginalis* is not genetically adapted to live in an acidic environment, since it lacks the ArsR gene responsible for adaptability to acidic pH [10, 16, 17].

More recently, a new effective method of treating BV has appeared – a special intravaginal form of ascorbic acid 250 mg. A special feature of the drug is that by lowering the pH of the vagina to normal values, the growth of anaerobic microflora is suppressed and at the same time the growth of its own lactobacilli of the genus *Lactobacillus* is stimulated. 6 days are usually enough for the treatment of mild and moderate BV.

Studies have shown that ascorbic acid restores the natural acidic environment in the vagina on the first day, maintains the necessary pH during the day due to the special shape of the tablet, promotes the destruction of bacterial films and blocks the growth of opportunistic flora, creates conditions for the growth of normal vaginal microflora (*Lactobacillus acidophilus, Lactobacillus gasseri*). When the pH of the vagina decreases for several days, there is a pronounced suppression of the growth of anaerobic bacteria and the restoration of normal flora (*L. acidophilus, L. gasseri*) [18, 19].

In conclusion, it should be noted that with the clinical manifestation of vaginosis/vaginitis, the diagnosis of cervical pathology and HPV infection may be distorted, false positive cytology, false positive colposcopy, and a high risk of complications after biopsy and ablation may occur. Therefore, in order to increase the therapeutic and diagnostic effectiveness in epithelial pathology, it is advisable to carry out manipulations on the UC and vagina with an adjusted state of microbiocenosis.

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