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## USING THE METHOD OF MICROSCOPY OF UROGENITAL SMEARS TO OPTIMIZE THE DIAGNOSIS OF SEXUALLY TRANSMITTED INFECTIONS

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**Abstract:** Microscopic examination of genital swabs performed by the doctor at the appointment is part of a clinical study that allows you to determine the cause of the patient's complaints already during the first visit. With certain skills, the doctor can conduct a study quickly enough while the patient is dressing. In most cases, an etiological diagnosis can be established already during the first visit and adequate treatment can be prescribed. The specificity of the microscopy method in the hands of an experienced doctor reaches 100%. The economic effect of direct microscopy should be noted. The method is low-cost, inexpensive, and saves time for both the doctor and the patient.

**Keywords:** Sexually transmitted infections, microscopy, urogenital swabs.

**Introduction.** Sexually transmitted infections (STIs) are the main cause of reproductive tract diseases. Most of these infections do not have clinical manifestations. Infections that are not diagnosed and treated in a timely manner can lead to complications such as inflammatory diseases of the pelvic organs, infertility, ectopic pregnancy, as well as pregnancy complications, infection of the fetus and newborn. One of the successful ways to reduce the incidence and development of complications is high-quality and timely diagnosis of STIs, which allows the doctor at the reception to make a diagnosis and immediately begin etiological treatment.

Taking a urogenital swab is part of a clinical study in the work of many practitioners. However, according to the established tradition, in most cases, the assessment of smears is carried out by laboratories. This leads to the need for a repeated visit of the patient to the doctor and to the expectation of results from the laboratory. In this case, the time of the doctor and the patient and the connection between the information obtained during the clinical examination and the assessment of the smear are lost; the time interval between the first visit to the doctor and the start of treatment is lengthened.

The microscopy of urogenital swabs used in the doctor's office allows for early diagnosis of STIs while the patient is in the doctor's office, and prescribing treatment at the first appointment before laboratory results are available, and thus reduce the possibility of infecting sexual partners and further spread of infection.

**The purpose** of this article is to attempt to evaluate the benefits of using urogenital smear microscopy performed in the office by the attending physician.

### Materials and methods

**Examination of vaginal smears.** Examine the wet smear. The material is obtained with a disposable plastic loop with a volume of 10  $\mu$ l. Microscopy is carried out at magnification of a light microscope x40 (if available) or x100 and x400.

**Examination of cervical and urethral smears.** The material is taken from the cervical canal with a cotton swab, while the mucus is carefully removed from the exocervix. From the urethra of both women and men, the material is taken with a disposable plastic loop with a volume of 1  $\mu$ l. Smears are applied to a glass slide, dried in air and stained with an alcohol solution of methylene blue according to Loeffler [2]. After that, the smears are rinsed in running tap water and dried with a napkin or a stream of hot air (hairdryer). Microscopy is carried out at magnification of a light microscope x100 and x1000.

### Results

The time spent for the preparation of smears and their microscopy are presented in Table 1.

**Table 1**

**Time-consuming preparation and microscopy of vaginal, cervical and urethral swabs in women and urethral swabs in men**

Action	Time spent (in minutes)	
	Pap smear obtained from women	Pap smear obtained from men
Microscopy of a wet (native) smear at x40 magnification (if available) or x100 and x400	1	-
Air drying	0,5	0,5
Staining a smear with an alcohol solution of methylene blue according to Loeffler, rinsing with running water, drying with a napkin or hot air jet	1	1
Microscopy of stained smear at x100 and x1000 magnification	1-2	0,5-1
Total	3,5-4,5	2,0-3,0

The time spent per patient depends to a large extent on the condition of the patient and the experience of the doctor who performs the microscopic examination. After the practical skills acquired during training and self-education, the doctor reviews the material taken from the patient for 3-4 minutes. In the absence of any changes in smears, the time spent is even less. An experienced physician trained in smear microscopy and performing this examination in routine practice performs this

examination during the time that the patient(s) is dressing and can immediately start a conversation and prescribe treatment.

The conclusions that can be made by a doctor when conducting microscopy of urogenital smears in the presence of a patient are presented in Table 2.

**Table 2**

**Conclusions that can be made by a doctor when conducting microscopy of urogenital smears in the presence of a patient or patient [3]**

Gender	Place of taking material	Microorganisms and "key" cells	Leukocytes in the field of view of the microscope	Conclusion
Man	urethra	Not detected	<4	Healthy
		<i>N. gonorrhoeae</i>	>4	Gonococcal urethritis
		Other microorganisms	>4	Nongonococcal urethritis
Woman	vagina	Lactobacilli	Quantity depends on the phase of the menstrual cycle	Healthy
		"Key" cells	Norm	Bacterial vaginosis
		<i>Candida spp.</i>	enlarged	Candida vaginitis
		<i>T. vaginalis</i>	enlarged	Trichomonas vaginitis
		Other microorganisms	enlarged	Nonspecific vaginitis
	cervical canal	Not detected	< 20	Healthy
		<i>N. gonorrhoeae</i>	> 10–20	Gonococcal cervicitis
		Other microorganisms	> 10–20	Nongonococcal cervicitis
	Urethra	Not detected	< 5	Healthy
		<i>N. gonorrhoeae</i>	> 5	Гонококковый уретрит
		Other microorganisms	> 5	Nongonococcal urethritis

As can be seen from the data given in Table 2, the doctor can immediately make several conclusions at the appointment:

**The patient is healthy**

All clinical and microscopic parameters are normal.

**Bacterial vaginosis (BV)**

It is the most common cause of vaginal discharge in women of childbearing age [6]. The diagnosis is based on the Amsel criteria [5, 6], although it has been shown that for the diagnosis of BV it is sufficient to detect “key” cells (more than 20 in the preparation) and the absence of lactobacilli in vaginal smears [1].

**Vulvovaginal candidiasis**

*Candida* spp. is the most common cause of vulvovaginitis. The course of the disease and the number of detected yeast-like fungi are not always related to each other. At the beginning of inflammation, blastospores of the fungus are found in large numbers, and with a progressive infection, pseudomycelium is most often detected. Smear microscopy reveals about six out of ten positive cases. However, the isolation of yeast-like fungi of the genus *Candida* in routine practice is not recommended, since they can be found in approximately 20–40% of healthy women [6].

**Trichomoniasis**

*Trichomonas vaginalis* is also a common cause of vaginal inflammation. The microscopic method of studying a native (wet) smear is considered to be very reliable in the diagnosis of this infection and makes it possible to detect 5–8 out of 10 cases of the disease [2]. Most authors confirm that the use of different smear staining methods to detect *Trichomonas* significantly reduces the sensitivity of the microscopic method [3, 4] and makes it difficult to make a diagnosis. It is important to remember that the diagnosis of trichomoniasis is based on the detection of mobile protozoa - *Trichomonas*. *Trichomonas* are extremely sensitive to environmental factors, especially to temperature changes, and therefore the transfer of material even to a nearby laboratory for 5–50 minutes can lead to a false negative result. In addition, the establishment of a diagnosis based on the detection of "atypical", "tailless" or "fixed" forms of *Trichomonas* is unacceptable, as this is only the result of the observation of artifacts that have no precedent in international practice. The diagnosis of trichomoniasis on the basis of such "finds" indicates insufficient qualifications of the personnel conducting the study.

**Gonorrhea**

The diagnosis of gonorrhea, established by microscopic examination, is reliable in the presence of urethritis in a man. This method detects 95-100% of cases of gonococcal urethritis in men [5]. In the case of gonococcal infections in women, microscopy reveals only 50% of infected women, although the specificity of this method remains very high (therefore, the bacteriological method of examination is mandatory for the examination of women). When conducting direct microscopy of smears by a doctor at the reception, gonorrhea can be suspected - if smears taken

from the urethra in men and the cervical canal and urethra in women have a large number of leukocytes and the presence of diplococci located intra- and extracellularly. The final conclusion on the study on *Neisseria gonorrhoeae* is made by the laboratory in which Gram staining of smears or culture is carried out.

### **Urethritis/cervicitis**

The diagnosis of urethritis is established exclusively by the microscopic method. The presence of patient complaints about discharge from the urethra without microscopic confirmation (an increase in the number of polymorphonuclear leukocytes) is not a basis for establishing a diagnosis of urethritis. Conversely, the detection of a large number of leukocytes on microscopic examination, even in the absence of discharge complaints, is a proven evidence of the presence of urethritis [1–3]. At the same time, the number of leukocytes is more than 4 in the field of view with a magnification of a light microscope by 1000 times when viewing at least 5 fields of view is sufficient to diagnose urethritis in men, more than 5 leukocytes in the field of view - in women. At the same time, the diagnosis of cervicitis is established only when mucopurulent discharge from the cervical canal is detected in combination with an increase in the number of leukocytes (more than 10 or 20 in the microscope field of view at x1000 magnification when viewing at least 5 fields of view) [2, 4]. The detection of only discharge from the cervical canal or only a large number of leukocytes in smears from the cervical canal is not the basis for the diagnosis of cervicitis. Only a combination of two features is required.

### **Quality control of material taking**

The doctor who performs the microscopic examination can control the quality of the smear. This is very important for research conducted in laboratories. Experience shows that about 2/3 of doctors who come to study the method of microscopy do not find the material that they took themselves and placed on the glass. This is especially true for swabs taken from the urethra of women. In addition, the most common mistake is that the material is taken incorrectly from the cervical canal. When taking the material, the cervix and exocervix are not processed, the mucus is not removed, as a result, not the material from the cervical canal, but the material from the vagina is placed on the glass slide. When conducting a microscopic examination, instead of a cylindrical epithelium and leukocytes from the cervical canal, a large number of leukocytes of vaginal origin and stratified squamous epithelium cells can be found. And this, when receiving a response from the laboratory, is often falsely assessed by the doctor as one of the signs of cervicitis.

### **Importance of the laboratory**

The use of the microscopy method by the doctor at the reception does not replace and does not at all reduce the role of the laboratory service. On the contrary, a doctor using the microscopy method makes higher demands on the laboratory, thereby creating opportunities to improve the quality of joint diagnostic work. When establishing a diagnosis of urethritis or cervicitis, the doctor must examine the patient

for chlamydia. If diplococci are found in materials from the urethra or cervical canal, a referral for a bacteriological study for gonococci with the determination of the antibiotic sensitivity of the isolated gonococci is mandatory. Thus, the requirements for the quality of laboratory research are increasing. In other words, laboratory tests move to a higher level, especially if the doctor takes clinical material with better quality.

### **Conclusion**

Microscopic examination of genital swabs performed by the doctor at the appointment is part of a clinical study that allows you to determine the cause of the patient's complaints already during the first visit. With certain skills, the doctor can conduct a study quickly enough while the patient is dressing. In most cases, an etiological diagnosis can be established already during the first visit and adequate treatment can be prescribed. The specificity of the microscopy method in the hands of an experienced doctor reaches 100%. The economic effect of direct microscopy should be noted. The method is low-cost, inexpensive, and saves time for both the doctor and the patient. The fact that the doctor himself conducts microscopic examination allows more targeted use of laboratory resources for qualitative research. The doctor who performs the microscopic examination himself masters the quality control tool for taking smears and, in case of failure, can always retake the material. As experience has shown, doctors who use the microscopy method enjoy great prestige with their patients.

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