EDUCATIONAL COMMENTARY – VAGINAL INFECTIONS

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**Florida licensees, please note: This exercise is NOT intended to fulfill your state education requirement for molecular pathology.

LEARNING OBJECTIVES

On completion of this exercise, the participant should be able to

- list three types of vaginal infections and identify the most common type.
- describe the clinical manifestations of each type of vaginal infection discussed.
- identify the most appropriate laboratory tests to determine the causes of vaginal infections.
- discuss the therapeutic agents used to manage each type of vaginal infection.

Vaginitis and vaginosis constitute a category of genital infections. Vaginal symptoms are a common complaint and one of the most frequent reasons women visit their gynecologist in the United States. Three major types of vaginal infections in adult women are bacterial vaginosis, yeast vaginitis, and *Trichomonas* vaginitis. Because the signs and symptoms of these conditions overlap, a clinical diagnosis cannot be definitive, and laboratory testing is recommended to determine the underlying cause.

**Bacterial Vaginosis**

Bacterial vaginosis (BV) results from a disturbance of the vaginal microbial ecosystem. It is the most common cause of vaginal symptoms and is responsible for 40% to 50% of vaginal infections, with an estimated prevalence in the United States of more than 21 million. Bacterial vaginosis was first described by Gardner in 1955. The organism later implicated as the cause of this condition was named for him: *Gardnerella vaginalis*. It is now known that *G vaginalis* is not the only agent responsible for bacterial vaginosis.

Gardner was the first to describe the presence of “clue cells” in patients with BV. Clue cells are vaginal epithelial cells that are covered with small coccobacillary bacteria such that the cell edges appear fuzzy and indistinct. The predominant flora of the healthy vagina is *Lactobacillus* species. In BV, the normal flora is replaced with an overgrowth of several bacterial agents including *G vaginalis*, *Atopobium vaginae*, *Mycoplasma hominis*, *Mobiluncus* species, and other anaerobic gram-negative rods. Because there is little inflammation present, the term *vaginosis* is considered more appropriate than *vaginitis*. The cause of the altered vaginal flora is unknown, but it is recognized that the loss of hydrogen-producing *Lactobacillus* species results in an increased pH and allows the growth of the mixed flora that leads to the
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symptoms of BV. Women with BV are usually sexually active, and the predominant complaint is of a malodorous (often described as “fishy”) vaginal discharge that frequently occurs after unprotected intercourse. The alkalinization caused by semen enhances the chemical amines produced by the bacteria involved. Originally BV was considered only a nuisance, but it is now recognized as a contributor to obstetric complications and as a risk factor for human immunodeficiency virus (HIV) infection.

The methods used to diagnose BV have not been straightforward. In 1983, Amsel et al. introduced clinical criteria for the diagnosis of BV. Three of the following four findings should be present:

1. homogeneous vaginal discharge
2. vaginal pH greater than 4.5
3. clue cells on saline wet mount
4. release of a fish amine odor on the addition of 10% potassium hydroxide (KOH) to vaginal discharge specimen (“whiff test”)

Amsel’s method relies on clinical assessment and depends on the acuity of the physician performing the test. A more objective diagnostic method was described in 1991 by Nugent et al. The Nugent score is determined by preparing a Gram stain of the vaginal secretions and assessing the morphologic features of the bacteria present. The presence of a predominance of Lactobacillus morphotypes is considered normal and will yield a low Nugent score (0 to 3), whereas a predominance of the mixed flora morphotypes (Gardnerella/gram-negative bacilli) will yield a high Nugent score (≥ 7) and is consistent with BV.

Culture for G vaginalis is not recommended because this organism can be found in up to 50% of women with no evidence of BV. A DNA probe is available, but it is based specifically on the detection of G vaginalis. Thus, the Gram stain is more specific than culture or probe testing, and is the recommended laboratory tool for diagnosing BV. It must be emphasized, however, that evaluation of the Gram stain requires technical expertise, and the quality of the specimen and of the slide preparation are important to the accuracy of this technique. The recommended treatment for BV is oral metronidazole; clindamycin can also be used. Treatment of sexual partners is not generally recommended.

Yeast Vaginitis

Approximately 20% to 25% of vaginal infections are caused by yeast, a condition referred to as vulvovaginal candidiasis (VVC). It is estimated that 75% of women will experience at least 1 episode of VVC during their lifetime. Candida albicans and other species of Candida can be found in the vaginal flora of up to 30% of asymptomatic women. Under certain conditions, colonization will lead to
symptomatic infection. Factors that can trigger germination of the yeast and lead to infection include pregnancy, uncontrolled diabetes, HIV infection, immunosuppressive therapy, antibiotic therapy, and the use of oral contraceptives. Women who are colonized with yeast and wear tight clothing can also be predisposed to VVC. The contribution of sexual transmission in VVC is poorly understood. Although Candida organisms can be transmitted via sexual intercourse and orogenital contact, this infection also occurs in celibate women. Therefore, VVC is not usually considered a sexually transmitted infection (STI).

The most common symptom in women with VVC is vulvar itching. Most patients also report pain on urination and painful intercourse. Vaginal discharge can vary and although it is often described as white, thick, and cottage cheese-like, in some patients it is minimal and watery. The diagnosis of VVC is usually based on microscopic demonstration of yeast in vaginal secretions. A wet mount with saline or 10% KOH will reveal the presence of budding cells when examined microscopically. Appropriate adjustment of the light microscope is critical to reveal the presence of yeast. Culture is not necessary, unless the result of microscopic examination is negative in a patient with a consistent clinical presentation. The vaginal pH is normal and the whiff test is negative. A DNA probe that detects the presence of Candida species is available.

Trichomonas Vaginitis

The third form of vaginal infection is trichomoniasis, which accounts for 15% to 20% of vaginal infections. This infection is caused by the flagellate protozoan parasite Trichomonas vaginalis. Trichomonas vaginalis is not normally present in the vagina and is almost always acquired through sexual contact; thus trichomoniasis is considered an STI. After an incubation period of a few days, symptoms of itching and increased purulent malodorous vaginal discharge will develop. Physical examination often reveals vulvar erythema with copious vaginal discharge that may be yellow-green and frothy. The vaginal pH is elevated, and results of a whiff test will be positive. Trichomonas infection has been associated with obstetric complications including premature rupture of membranes, preterm delivery, and low birth weight. It is also associated with an increased risk for HIV infection.

The clinical features of Trichomonas infection are not specific and cannot provide a diagnosis; thus, laboratory testing is necessary. Traditional test methods demonstrate the presence of the organism. A
saline wet preparation of the vaginal discharge can be used to visualize the motile flagellated trichomonads; increased white blood cells are also found. On occasion, *Trichomonas* parasites can be discovered when performing microscopy on urine sediments. Microscopy is 60% to 70% sensitive when performed on a fresh specimen by an experienced microscopist. *Trichomonas vaginalis* can be cultured in a specialized liquid medium. The specimen is inoculated into the medium, incubated for 48 hours, and aliquots are examined microscopically for the parasite. A commercial culture pouch system is also available. Although culture improves diagnostic ability, it is not readily available. Other commercial methods for diagnosis include a point-of-care rapid antigen test, a DNA probe, and a nucleic acid amplification test (NAAT). Recent studies have demonstrated the prevalence of *Trichomonas* infection to be equivalent to or greater than that of infection with *Chlamydia trachomatis* and *Neisseria gonorrhoeae*; thus, many practitioners now screen for all three pathogens simultaneously. Treatment for trichomoniasis includes metronidazole or tinidazole. Simultaneous treatment of all sexual partners is recommended.

**Conclusion**

Vaginal symptoms due to vaginitis/vaginosis affect many women. These conditions may occur as a random process with minimal implications; however, in some patients they recur, becoming a long-term problem. In addition, some of these conditions lead to complications in pregnancy as well as an increased risk for other genital infections. Because the clinical features of these conditions are similar, they cannot be differentiated by signs, symptoms, or physical findings alone. In addition, the laboratory tools available do not always provide the answer. Microscopy is the primary method used, and the sensitivity of detection depends on the technical expertise of the personnel performing the test and on the quality of the specimen. A DNA probe is available, designed to differentiate and identify three major causes of vaginitis/vaginosis: *Candida* species, *T vaginalis*, and *G vaginalis*. A separate NAAT for trichomoniasis is also available; it shows promising results for the detection of *T vaginalis* and can be performed on genital as well as urine specimens. Perhaps the advent of these molecular tests will improve the ability to accurately diagnose these vaginal maladies and allow prompt treatment for prevention of complications.

**References and Suggested Reading**


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