

Etiology, Diagnosis, and Management of Vaginitis

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Women often seek medical care for vaginal complaints. Many times, the cause of the complaint is misdiagnosed by the woman and/or her provider. These vaginal complaints may be related to infections, which when misdiagnosed or mistreated, can lead to more severe problems. This article describes the three most common vaginal infections, bacterial vaginosis, trichomoniasis, and vulvovaginal candidiasis. Appropriate diagnostic techniques and management therapies are reviewed. *J Midwifery Womens Health* 2006;51:423–430 © 2006 by the American College of Nurse-Midwives.

keywords: bacterial vaginosis, trichomoniasis, vulvovaginal candidiasis

INTRODUCTION

Vaginitis is one of the most common conditions for which women seek medical care. Approximately 10 million office visits each year are attributed to vaginal discharge complaints.¹ Many women with vaginal complaints self-treat incorrectly with over-the-counter drugs.² Health care providers themselves may miss the correct diagnosis if they fail to confirm the diagnosis with the proper laboratory tests.³

Vaginal symptoms are usually related to one of three conditions: bacterial vaginosis (BV), vulvovaginal candidiasis (VC), and trichomoniasis.¹ These infections usually respond to appropriate treatment; however, misdiagnosis and pharmacologic failure may occur. Other less common forms of vaginal symptoms include atrophic vaginitis, chemical irritation, lichen planus, allergic vaginitis, desquamative vaginitis, and foreign body.^{1,4}

It is important to accurately diagnose the problem and prescribe the appropriate treatment. This is relatively easy to do by performing a thorough assessment, including wet mount microscopy, pH testing, and cultures as needed.^{1,4}

This article discusses the etiology, diagnosis, and management of the three most common vaginal infections.

BACTERIAL VAGINOSIS

BV is the most common cause of vaginal discharge,⁵ and one of the most prevalent lower genital tract infections in women of reproductive age.⁶ The prevalence is reported to be between 25% and 36% in women attending sexually transmitted infection clinics.⁷ A substantial number of women are asymptomatic. Among women with BV who report symptoms (an estimated 10%–66%), vaginal malodor is the most suggestive symptom.^{8,9} This condition is not associated with vaginal inflammation (such as finding excess leukocytes in the discharge or vaginal wall erythema), thus the term “vaginosis” is used instead of “vaginitis.”¹⁰ In fact, a finding of more than one leukocyte per epithelial cell on a microscopic evaluation of

vaginal discharge should lead the provider to look for a diagnosis other than BV.⁴

BV has been associated with many complications, including second trimester miscarriage, pelvic inflammatory disease, preterm birth, preterm premature rupture of the membranes, chorioamnionitis, postpartum endometritis, postoperative infection after gynecologic surgery, and easier acquisition of HIV.^{6,11–14}

The normal vagina of a woman of reproductive age is colonized with lactobacilli. These lactobacilli produce bacteriocins, hydrogen peroxide, and lactic acid, all of which are substances that lower the vaginal pH. The low pH creates a hostile environment for bacteria other than lactobacilli. If the number of lactobacilli are decreased, the resulting increase in pH favors an overgrowth of anaerobic and facultative bacteria, which can predispose to the development of BV.¹¹ The predominant organisms that cause BV are *Gardnerella vaginalis*, *Mycoplasma hominus*, and *Ureaplasma urealyticum*. Other anaerobes, such as *Prevotella*, *Mobiluncus*, *Bacteroides*, and *Peptostreptococcus*, have also been identified as flora associated with BV.^{1,11}

Risks Factors for BV

Risk factors for BV have been identified and include douching and race, among others (Table 1).^{5,11,15,16} Zhang et al.¹⁷ found in increased rate of BV in women who douched one or more times per week when compared to those who douched less frequently or not at all. Schwabe¹⁸ studied douching and the prevalence of BV among predominately black adolescents who douched regularly. BV was diagnosed in 44.8% of the study population. He found that douching in the previous week was positively associated with BV and that there was a strong association between douching after menses and the prevalence of BV. The reason for these associations is not known. It is possible that douching decreases lactobacilli, thus facilitating the growth of the bacteria known to cause BV, but findings have been inconsistent. It is also possible that douching during the time of unstable flora, such as the time after menses, may lead to the acquisition of BV.¹⁷ Even though several studies have shown that frequent douching is associated with

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Table 1. Risk Factors for Bacterial Vaginosis

Douching
Use of an intrauterine device
New male partner
No condom use
Race
Sex with another woman
Smoking

Sources: Klebanoff et al. 2004⁵; Ness et al. 2004¹¹; Verstraelen et al. 2004¹⁵; Alfonsi et al. 2004.¹⁶

BV, it is unknown if the douching causes the BV or if the women douche as self treatment for the symptoms.¹⁶

Race is also implicated as a risk factor for BV.^{10–12} Klebanoff et al.⁵ evaluated more than 1000 women diagnosed with BV and found it more common in young women who are African American and those who smoke. Poor general health status was associated with an increased prevalence of BV. Others have reported that African American women have a greater than 2-fold higher rate of having BV than white women.¹³

Symptoms

Many women who meet the laboratory criteria for a diagnosis of BV are asymptomatic. Although a malodorous vaginal discharge described as “fishy” suggests the presence of BV, it is not reliable enough to use as the only criterion for diagnosis. Some women with BV may report abnormal discharge, but this symptom is also unreliable.⁵ Klebanoff et al.⁵ studied women between the ages of 15 and 44 who attended 12 specific health departments for a routine annual health assessment. All participants underwent a pelvic exam that included tests for pH, wet mount, Gram stain, gonorrhea, and chlamydia. In addition, the participants were interviewed about vaginal symptoms. Reports of symptoms were compared between those who had a positive diagnosis of BV and those who did not. Their results showed that 82% of women without BV reported never noticing any vaginal odor compared to 75% of women with confirmed BV who reported noticing no odor. The authors concluded that although more women with BV report vaginal odor than do women without BV, the difference is minimal, and reliance on this symptom is not clinically valuable.

Diagnosis

No single symptom has enough predictive power to accurately diagnose any of the common infections. Al-

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though signs and symptoms can assist in the diagnosis, the wet mount with microscopy is the best way to confirm the diagnosis.⁴ Studies have shown that a diagnosis of BV based on symptoms alone is often inaccurate compared to diagnosis based on laboratory criteria.^{18,19} In addition, basing diagnosis solely on symptoms will miss those women who would have laboratory-confirmed diagnosis of the infection but are asymptomatic.⁷

Amsel's criteria have been used for making the diagnosis of BV for many years. The four diagnostic criteria are: 1) a vaginal fluid pH >4.5; 2) >20% of epithelial cells are “clue” cells (cells with unclear borders, dotted with bacteria); 3) milky homogenous, adherent vaginal discharge; and 4) a positive “whiff” test, which is an amine or “fishy” odor noted after the addition of 10% potassium hydroxide. The presence of three out of four criteria are recommended by Amsel for diagnosis.^{20,21} If there is no microscope available or if the skills of the practitioner are limited, the Affirm VPIII microbial identification system (Beckon Dickinson and Company, Sparks, MD) can be used. This DNA probe system can be used to identify BV, trichomoniasis, or candida.²² This assay detects clinically significant levels of Gardnerella, trichomonads, and candida from vaginal fluid. Test results can be available in less than an hour. For offices that need to delay transport of the specimens, there is an extended transport system, Affirm VPIII Ambient Temperature Transport System (ATTS), which allows the specimen to remain stable in ambient temperature up to 72 hours after collection. Each of the Affirm VPIII kits come with sample swabs and transport collection tubes. Another test that can be used is the QuickVue Advance pH and Amines Test card (Quidel Corporation, San Diego, CA). A drop of vaginal secretion is placed on the card for rapid identification of pH. The sensitivity of this test is 94% when compared to culture.⁴

A newer, easy test for detecting BV is OSOM BVBlue (Genzyme Corporation, Cambridge, MA). The kit comes with sample swabs and reagent. The vagina is swabbed and the swab placed into the test tube with the reagent. The reagent turns blue or green if the sample is positive for BV.²³ This is a 10-minute test that detects elevated sialidase activity in the vaginal fluid. The sialidase is produced by bacterial pathogens associated with BV, including Gardnerella and Mobiluncus.²³

A pH >4.5 is considered the most sensitive criterion (fewest false negatives) and the finding of >20% of epithelial cells as clue cells is the most specific (fewest false positives).⁷ Gutman et al.²⁴ conducted a study to determine if two criteria would be as reliable as three of the four criteria, described by Amsel. They calculated the sensitivity, specificity, and 95% confidence intervals for each criterion separately and in combinations of two. The vaginal pH >4.5 had the highest sensitivity and lowest specificity. This low specificity may be explained by the fact that the elevated pH is often found in postmeno-

pausal women and may be altered by cervical mucus, blood, or semen. On the other hand, a positive whiff test had the highest specificity and lowest sensitivity. Sensitivity of any two criteria ranged from 61% to 69%, which is similar to the sensitivity of 69% using Amsel's three out of four criteria. Specificity of any two criteria was between 86% and 95%, and similar to Amsel's. The authors conclude that using two criteria is as good as using three of Amsel's criteria. They concluded that if the pH is ≥ 4.5 and one other of Amsel's criteria is positive, the diagnosis of BV can be made.

According to Soper,⁴ a normal pH (< 4.5) should rule out the diagnosis of BV and the provider should then look for or rule out a fungal infection. If the pH is ≥ 4.5 , one should suspect BV, trichomoniasis, or mucopurulent cervicitis, which is also associated with an elevated pH. If there is more than one leukocyte per epithelial cell in a microscopic evaluation of the vaginal fluid, one should consider either trichomoniasis or mucopurulent cervicitis.⁴ Because mucopurulent cervicitis is often associated with gonorrhea or chlamydial trachomatis, testing for these infections should be done.

Treatment

The Centers for Disease Control and Prevention (CDC) recommends testing all symptomatic women and treating those who are positive for BV. In addition, those who are to undergo surgical abortion or hysterectomy may be screened and treated. Follow-up visits or treatment of partners is not recommended. Treatment of partners has not been found to decrease the incidence of recurrent BV.²⁵ A review of six randomized control trials done by Kane and Pierce²⁶ found no benefit in treating male partners of women with BV.

The recommended treatment for BV is metronidazole 500 mg orally two times daily for 7 days, or metronidazole gel 0.75% intravaginally daily for 5 days, or clindamycin cream 2% intravaginally once per day for 7 days.²⁵ Other treatments, such as metronidazole 2 g orally in a single dose or ofloxacin 200 mg orally twice daily have been shown to have similar cure rates at 2 weeks after treatment, but have higher relapse rates after that 2-week timeframe.^{1,26} It is important to remember that clindamycin cream can weaken latex condoms and diaphragms, and women should be advised to use other forms of contraception during treatment with clindamycin vaginal preparations.²⁵ The CDC-recommended regimens and alternate regimens can be found in Table 2. Women who are HIV-positive are treated the same as women who are HIV-negative. When comparing the cost of either of the CDC-recommended treatments, it should be noted that the cost of oral metronidazole is substantially less than that of the other two regimens.²⁷

In women who are allergic to metronidazole, treatment with clindamycin is recommended. For those who have

Table 2. Treatment Regimens for Bacterial Vaginosis Approved by the CDC

	Dose	Duration
Medication		
Metronidazole	500 mg orally twice daily	7 days
Metronidazole gel 0.75%	One intravaginal application daily	5 days
Clindamycin cream 2%	One intravaginal application daily	7 days
Alternate Regimens*		
Clindamycin	300 mg orally bid	7 days
Clindamycin ovules	100 g once daily	3 days

From the Centers for Disease Control and Prevention (2006).²⁵

*A 2 g oral dose of metronidazole is no longer recommended as an alternative for treating BV.

gastrointestinal symptoms when taking oral metronidazole, vaginal metronidazole therapy can be used.²⁵

BV and Pregnancy

BV has been associated with poor pregnancy outcomes. CDC recommendations include treating all symptomatic pregnant women. In 3 of 4 randomized studies, screening and treating asymptomatic women who are at high risk for preterm birth has reduced the preterm birth rate.²⁵ Those pregnant women who are asymptomatic and treated should be re-examined 1 month after treatment to determine if the therapy was curative.²⁵ The data do not support using topical treatments during pregnancy, as evidence from three studies indicated an increase in prematurity and neonatal infections in those treated with clindamycin cream.²⁵ The following are recommended: metronidazole 500 mg orally, twice per day for 7 days or metronidazole 250 mg orally, three times per day for 7 days, or clindamycin 300 mg orally two times per day for 7 days. Treatment can occur during any trimester of pregnancy.²⁵ Practitioners may be hesitant to treat with metronidazole during the first trimester based on their concern that it is teratogenic. A recent meta-analysis, including studies that had at least 10 women exposed to metronidazole during the first trimester, found no increase in birth abnormalities.²⁸ The CDC no longer has the stipulation that metronidazole treatment be deferred until after the first trimester.²⁵

Recurrent BV

Recurrence of BV is very common and has been reported to be as high as 70% over a period of 9 months following initial diagnosis.⁴ Women are often frustrated and embarrassed to come back in for follow-up, but because of the high rate of recurrence, they should be encouraged to notify the clinician at the onset of symptoms. The CDC guidelines acknowledge the problem of recurrent BV and currently do not recommend any long-term manage-

ment.²⁵ The 2006 CDC guidelines suggest that women with multiple recurrences be managed in consultation with a specialist.²⁵ Others recommend confirmation of the recurrent BV diagnosis by Gram stain, which is the gold standard diagnostic technique. After the diagnosis is confirmed, one may prescribe a 10- to 14-day regimen of oral metronidazole 500 mg twice daily.^{1,4,25}

Another regimen suggested is vaginal metronidazole 0.75% once daily for 10 days, followed by twice weekly application for 4 to 6 months.¹⁶ A recent trial of treatment for persistent BV found that twice a week application of 0.75% metronidazole gel for 6 months maintained a clinical cure.²⁹ Even with extended therapy, relapse is common after stopping the therapy.⁴ In addition, long-term use of metronidazole may lead to an increased rate of vulvovaginal candidiasis.³⁰ Some have suggested using nystatin and metronidazole as primary treatment for recurrent BV. In a study conducted in Peru by Sanchez et al.,¹⁴ women with diagnosed BV were either treated with vaginal metronidazole gel (MetroGel vaginal; 3M Pharmaceuticals, Northridge, CA) 0.75% for 5 days or ovules containing metronidazole 500 mg and nystatin 100,000 U for 5 days. The recurrence rates were significantly lower in the combination medication group than the vaginal metronidazole gel group even up to 104 days after treatment.

Tinidazole has been suggested as a treatment for refractory BV³¹ (an off-label use). It is a nitroimidazole derivative similar to metronidazole. It has a higher peak concentration and longer half-life than metronidazole, which would lead to more stable blood levels than occur with metronidazole. In a case report by Baylson et al.,³¹ a woman with refractory BV was treated with tinidazole 500 mg twice daily for 2 weeks. She remained asymptomatic for 10 months after treatment. They also reported that a 2-gram single dose of tinidazole resolves nonrecurrent BV. Tinidazole has been shown to cause less gastrointestinal side effects than metronidazole.³¹

Recolonization of the vagina with lactobacilli has been suggested as a line of therapy for recurrent BV. Ongoing studies evaluating this therapy are in clinical trials. Because data are lacking and commercial lactobacillus preparations are not standardized, the use of these preparations is not recommended.^{16,25}

TRICHOMONIASIS

Trichomoniasis is the most common nonviral sexually transmitted infection (STI). Approximately 5 million women in the United States are infected annually.^{32,33} This may actually be an underestimate of the incidence of trichomoniasis. Screening methods are relatively insensitive and this infection is often not reported.³² It is caused by a protozoan, *Trichomonas vaginalis*.²⁵ Infection with *T vaginalis* is easily transmitted sexually and is associated with an increased risk of acquiring HIV.^{25,32}

The mechanism of action is thought to be an increase in the vaginal secretions of CD4⁺ cells, which serve as target cells for the HIV virus.³ Furthermore, trichomoniasis infection is also associated with coinfection with other STIs.³²

Symptoms

Between 50% and 75% of trichomoniasis infections are thought to be asymptomatic.³² The most common symptoms are vulvar itching and increased, malodorous vaginal discharge, which is yellow-green in color.²⁵ Other symptoms may include petechiae on the cervix and erythema of the vagina.

Diagnosis

The diagnosis is usually made via wet mount microscopy that shows motile trichomonads. This method has a sensitivity rate of only 60% to 70%.²² This low sensitivity rate may be explained by the fact that the length of time the protozoa are motile differs from person to person, and the fact that the large amount of inflammation associated with the vaginitis may preclude the observation of the motile protozoa. In women who are suspected to have trichomoniasis (i.e., those with symptoms but no observable motile trichomonads), culture for *T vaginalis* is recommended.¹ Other findings that might lead the practitioner to suspect trichomoniasis are leukocytes on microscopy and pH >4.5.⁴ The culture is more sensitive for diagnosis than any other commercially available method, but is too costly to be used as primary method for diagnosing.^{25,33} As previously stated, the Affirm VP III system includes testing for trichomonads. More recently, another test has been developed and also provides quick results. The OSOM Trichomonas Rapid Test (Genzyme Corporation), recently approved for use by the US Food and Drug Administration (FDA), is an antigen-based diagnostic test. High sensitivity and specificity rates have been reported for this test.³²

Because the sensitivity of a wet mount is low, some women who have a negative wet mount will have trichomoniasis. In a study of 2194 women who presented for STI evaluation, Swygard et al.³³ found that 17.5% had culture-proven trichomoniasis. Using logistic regression, they identified three characteristics that were predictive of a positive culture in women with symptoms who had a negative wet mount: contact to trichomonas, African American race, and self-reported drug use. These authors concluded that using cultures for the patients who have one of these predictive characteristics could help improve detection of trichomoniasis.

Treatment

All nonpregnant women with symptomatic or asymptomatic trichomoniasis should be treated. Sexual partners

should be treated as well.^{1,25} The standard treatment recommended by the CDC is metronidazole 2 grams orally in a single dose or tinidazole 2 g orally in a single dose. The alternative regimen is metronidazole 500 mg twice daily for 7 days.²⁵ More recently, tinidazole in a 2-gram dose has been approved by the FDA for the treatment of trichomoniasis. This drug has been used in other countries for years with good results,¹ and has been added to the 2006 CDC recommended treatment guidelines.²⁵ Treatment of women who are HIV-positive is the same as for women who are HIV-negative.

Neither topical metronidazole therapy nor therapy with other topical classes of drugs has been shown to be as efficacious in the treatment of trichomoniasis as oral therapy.²⁵ The trichomonads may be found in the urinary tract as well as the crypts of the vagina, so it is reasonable that topical treatments may not work as well as systemic treatments.

Recurrent Trichomoniasis

In recurrent infection or in the case of treatment failure, if reinfection is excluded, the patient should be retreated with 500 mg of metronidazole orally twice per day for 7 days or tinidazole 2 g in a single dose. If this additional treatment fails, treatment with either metronidazole or tinidazole 2 g orally for 5 days is recommended.²⁵ If this second regimen is not effective, providers are encouraged to consult a specialist. Susceptibility testing of *T vaginalis* to metronidazole and tinidazole should be done. Consultation and susceptibility testing are available from the CDC.²⁵

Recurrent infection may actually be reinfection from an untreated partner. It is very important that the practitioner emphasize the importance of partner treatment necessary to prevent reinfection.

Trichomoniasis and Pregnancy

Infection with trichomonas is associated with preterm delivery, premature rupture of the membranes, and low birth weight.^{1,3} Pregnant women with trichomoniasis have a 30% higher risk of delivering a baby with low birthweight or delivering preterm than those without the infection.³⁴ It is recommended that symptomatic pregnant women may be treated with a single 2-gram dose of metronidazole.²⁵ Treatment may be given in any trimester. Many practitioners prefer to wait until after the first trimester to treat, even though studies have not demonstrated teratogenic problems with metronidazole use.^{25,28} Although trichomoniasis is associated with preterm birth, there are no data supporting that treatment of trichomoniasis in the asymptomatic pregnant woman will decrease the incidence of preterm birth.²⁵ In fact, in some cases there is evidence that treatment may be more harmful to the pregnancy than not treating.³⁵ In a study done by Klebanoff et al.,³⁶ they found that asymptomatic pregnant women who were treated with metronida-

Table 3. Classification of Vulvovaginal Candidiasis

Uncomplicated Vulvovaginal Candidiasis	Complicated Vulvovaginal Candidiasis
Sporadic or infrequent vulvovaginal candidiasis; and Mild to moderate vulvovaginal candidiasis; and Etiology likely to be <i>C albicans</i> ; and Non-immunocompromised women	Recurrent vulvovaginal candidiasis; or Severe vulvovaginal candidiasis; or Non-albicans candidiasis; or Women with uncontrolled diabetes, debilitation, or immunosuppression or those who are pregnant

From the Centers for Disease Control and Prevention (2006).²⁵

zole had a higher preterm delivery rate than those treated with placebo (19% vs. 10.7%; $P = .004$; RR 1.8; 95% CI 1.2–2.7). They used a nonstandard dosing of 2 grams metronidazole with a repeat dose 48 hours later. The results were surprising to the authors, and not completely understood. It is thought that the dying trichomonads could "... elicit an inflammatory response or release a virus from the organism that increases the risk of preterm birth."³⁶ No studies to date have demonstrated that treatment of trichomoniasis during pregnancy has decreased poor outcomes in pregnancy.³² Based on this, the CDC does not currently recommend treating asymptomatic pregnant women for trichomoniasis nor do they recommend routine screening.^{25,32}

VULVOVAGINAL CANDIDIASIS

VC is the most common cause of infectious vaginitis, accounting for between 40% and 50% of all cases. It may cause genital discomfort, loss of productivity, reduced sexual pleasure, psychological problems, and medical expenses.³⁶ Seventy-five percent of reproductive-age women will have at least one episode of VC in their lifetime, and 40% to 45% will have two or more episodes.^{1,38}

Candidal infection is most often caused by *Candida albicans*, a fungal organism that is a part of the normal flora of the vagina of reproductive-age woman, but causes >90% of cases of symptomatic vaginitis. However, infection can also be caused by other species, such as *C glabrata* and *C tropicalis*. The latter two types often are more resistant to treatment.^{1,25} The relationship between colonization of the vagina (growth of *C albicans* on vaginal culture) and vaginitis symptoms is not understood. Certain factors are predictive of yeast colonization: positive HIV status, having diabetes, recent IV drug use, and recent antibiotic use.^{1,37} It is thought that other host factors play a role in whether or not women are symptomatic because a large number of women who are colonized have no symptoms.³⁷ VC is classified as uncomplicated or complicated based on frequency, symptoms, microbiology, and response to treatment (Table 3).

Table 4. Treatment Regimens for Vulvovaginal Candidiasis Approved by the CDC

	Brand Name	Dosage (qhs)	Duration
Intravaginal agents (one of the following)			
Butoconazole 2% cream	Mycelex 3	5 g intravaginally	3 days*
Butoconazole 2% sustained release tablet	Gynazole-1	5 g intravaginally	Single dose
Clotrimazole 1% cream	Gyne-Lotrimin-7; Mycelex-7	5 g intravaginally	7–14 days* [†]
Clotrimazole 100 mg tablet	Gyne-Lotrimin-7	1 tablet intravaginally	7 days
Clotrimazole 100 mg tablet	Gyne-Lotrimin-7	Place 2 tablets intravaginally	3 days
Miconazole 2% cream	Monistat-7	5 g intravaginally	7 days* [†]
Miconazole 100 mg suppository	Monistat-7	1 suppository intravaginally	7 days*
Miconazole 200 mg suppository	Monistat-3	1 suppository intravaginally	3 days
Miconazole 1200 mg suppository	Monistat-1	1 suppository intravaginally	Single dose*
Nystatin 100,000 unit vaginal tablet	Mycostatin	1 tablet intravaginally	14 days
Tioconazole 6.5% ointment	Vagistat 1	5 g intravaginally	Single dose*
Terconazole 0.4% cream (45 gms)	Terazol-7	5 g intravaginally	7 days [†]
Terconazole 0.8% cream (25 gms)	Terazol-3	5 g intravaginally	3 days
Terconazole 80 mg suppository	Terazol-3	1 suppository intravaginally	3 days
Oral agents			
Fluconazole	Diflucan	150 mg oral tablet	Single dose

From the Centers for Disease Control and Prevention (2006).²⁵

*Available over-the-counter.

[†]Recommended during pregnancy.

Signs and Symptoms

Vulvar irritation, including itching and discomfort of the vulvar skin and vaginal epithelium, vaginal discharge, dyspareunia, and discomfort with voiding are the most common symptoms reported.^{1,25,38} The subjective diagnosis of *Candida* infection may be inaccurate and, in fact, the accuracy of self diagnosis has not been validated.^{1,2,37} Ferris et al.² evaluated women within 24 hours of buying over-the-counter antifungal medications. Only participants who presented with unopened over-the-counter antifungal products were entered into the study. Pelvic examinations were performed, including cultures and wet mounts for microscopy. Only 33.7% of the participants actually had VC; 13.7% had normal vaginal findings.

Diagnosis

The diagnosis of VC is suggested in the woman who presents with vulvar irritation with itching, erythema, and a normal pH. Spores, hyphae, or yeast buds identified on wet mount confirm the diagnosis. The addition of potassium hydroxide to the wet mount slide will remove debris that may obscure the hyphae, and assists in making an accurate diagnosis. Women may have mixed infections; white blood cells and clue cells may also be present.⁴ Yeast culture is another diagnostic test for yeast. However, finding a positive culture for yeast in a symptom-free woman does not warrant treatment, as 10% to 20% of women carry yeast normally.²⁵

Treatment of VC

Uncomplicated VC is easily treated with topical azole antifungal medications in single or short-term doses^{25,38} (Table 4). This class of drugs is usually more effective than the older nystatin class of drugs. Treatment with the prescribed therapy of azole drugs results in relief of symptoms in 80% to 90% of patients.²⁵ Many of these azole drugs are available over-the-counter, but should be used by women who had a previous confirmed diagnosis of VC and currently have the same symptoms. Women should be reminded that many of these topical agents are oil-based and can therefore weaken condoms and diaphragms. It is recommended either that another form of contraception be used or that they abstain from sexual intercourse during the course of treatment.

Persistence of symptoms after treatment with the over-the-counter medication or recurrence of symptoms within 2 months of treatment warrants a visit to the clinician for an accurate diagnosis and treatment regimen.²⁵ Women who have self-diagnosed may have done so incorrectly.²

Treatment of partners is not recommended in women with uncomplicated VC as it is not acquired sexually. Treatment of uncomplicated VC in women who are HIV-positive is the same as that for women who are HIV-negative.²⁵

Complicated VC occurs in 10% to 20% of women and is much more difficult to treat. Recurrent VC, defined as 4 or more cases per year, is one type of complicated VC.²⁵ Most of these cases are caused by *C. albicans*. These infections respond well to the typical azole med-

ications but require a longer period of therapy. Initial therapy may be either a topical azole for 7 to 14 days, or an oral dose of fluconazole 150 mg followed by repeating the same dose 3 days and 6 days after the initial treatment.^{4,25} The first line maintenance regimen is oral fluconazole (100 mg, 150 mg, or 200 mg dose) weekly for 6 months. Others include topical clotrimazole 200 mg twice a week, clotrimazole 500 mg vaginal suppositories once weekly, or other topical treatments used intermittently.²⁵

The most beneficial duration of suppression is not known.^{3,25} Approximately 90% of women will be without symptoms during 6 months of suppressive therapy and about half will have no recurrences for another 6 months after stopping therapy.⁴ Routine treatment of male partners is controversial.²⁵

Ten percent of VC infection is caused by organisms other than *C albicans*. Of these cases, about 50% will respond to the standard azole treatment. The other 50% are much harder to treat, and the optimal treatment is not known.^{29,38} In cases that do not respond to the regular azole therapy, identification by culture of the specific organism is recommended.^{1,4,25,37} For the noncandida cases, the CDC first recommends longer therapy for 7 to 14 days with any nonfluconazole drug. If this is not successful, 600 mg of boric acid in a gelatin capsule may be administered vaginally once daily for 14 days.²⁵ This product may be found in health food stores.

Lactobacilli, normally-occurring bacteria in the mouth, intestinal tract, and vagina, have been suggested as treatment for recurrent VC. Although these bacteria are known to have some antimicrobial function, which would inhibit growth of harmful bacteria, studies have not supported that the use of oral or vaginal forms of lactobacillus prevent VC.^{1,39,40} Hilton et al.⁴¹ completed a small study to determine if eating yogurt containing lactobacillus acidophilus decreased the incidence of Candida cases. The incidence was reduced by 85% during the months the women consumed a yogurt-containing diet as compared to those who consumed a yogurt-free diet. More long-term studies are needed to evaluate these methods of treatment.^{41,42}

VC and Pregnancy

Many cases of VC occur during pregnancy and, in fact, pregnancy is listed as a cause of complicated VC^{25,38} (Table 3). Although rare, VC can lead to neonatal Candida infection, which is a major cause of septicemia in neonates. The neonatal infection is associated with a high morbidity rate (25%) and high mortality rate (25%–54%).⁴³ Because VC in pregnancy is considered to be “complicated,” the recommended treatment is topical azole treatment for 7 days. Oral antifungals are category C drugs, and are not recommended during pregnancy.

SUMMARY

Vaginal complaints, including discharge, irritation, dyspareunia, urinary complaints, and malodor are frequent concerns for women. These symptoms are often self-diagnosed and self-treated without confirmatory diagnosis.² Misdiagnosis by the woman or by the provider may lead to inadequate treatment, and consequences such as coinfections with microbes may lead to infertility or to the increased risk of acquiring HIV. The practitioner must be aware of the most likely causes of the reported symptoms, the risk factors and consequences associated with the incorrect diagnosis, the most appropriate way to diagnose the condition, and the correct methods of treatment. Women should be discouraged from indiscriminate use of over-the-counter medications for vaginal complaints.²

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