



other STIs as determined by commonly accepted measures (i.e., having new or multiple partners). Screening for bacterial vaginosis in pregnant women is a controversial topic.

Pathology

Candida albicans and *Candida glabrata* are the most common organisms responsible for *Candida* vulvovaginitis. These species may colonize asymptomatic women but their presence does not necessarily mean infection. Symptomatic cases are caused by an overgrowth of the species and penetration of the superficial vaginal epithelial cells. Overgrowth can result from increased estrogen levels or suppression of other vaginal flora by antibiotics.

Trichomoniasis is caused by the protozoan *T. vaginalis*, which infects the squamous epithelium in the urogenital tract. *T. vaginalis* is not normally present in the vagina and has an incubation period of a few days.

Bacterial vaginosis is caused by a variety of organisms flourishing in the vaginal ecosystem in conjunction with a reduction of normally occurring lactobacilli. The bacterium *Gardnerella vaginalis* is especially prominent in cases of bacterial vaginosis and is thought to infect the vaginal epithelium, creating a biofilm to which other bacteria may adhere. *G. vaginalis* is also the organism thought to play the most likely role in sexual transmission of bacterial vaginosis.

Clinical Presentation

Symptoms of vaginitis may include pruritus (i.e., primary feature of *Candida* vulvovaginitis); a change in the volume, color, or odor of discharge; burning; irritation; erythema; dyspareunia; spotting; and dysuria. In the case of trichomoniasis and bacterial vaginosis, infection is often asymptomatic but can be transmitted sexually. Symptomatic trichomoniasis in women most commonly includes a purulent vaginal discharge and erythema and irritation of the vulva. An abnormal odor is also often associated with infection.

Bacterial vaginosis manifests with milder symptoms of irritation and erythema and is rarely associated with dysuria or dyspareunia. Patients with bacterial vaginosis most commonly have a notably fishy odor in the vaginal discharge, which may also be abnormally colored or textured.

Diagnosis and Differential Diagnosis

Laboratory testing and microscopy are needed for a diagnosis of vaginitis. Examination of vaginal pH can be a helpful differentiating tool. *Candida* vulvovaginitis typically does not cause a change in vaginal pH, whereas bacterial vaginosis and trichomoniasis do increase the pH up to 6. The identification of *Candida* organisms on a wet mount or culture of discharge from women with characteristic clinical symptoms indicates *Candida* vulvovaginitis.

The diagnosis of trichomoniasis may be based on laboratory testing (NAAT), motile trichomonads on a wet mount, or positive culture results. Amsel's criteria or Nugent's criteria may be used to diagnose bacterial vaginosis when Gram stain or microscopy is available.

Treatment

Vaginitis is curable with proper antibiotic therapy. Trichomoniasis is treated with metronidazole (2 g taken orally once or 500 mg

orally twice each day for 7 days) or tinidazole. Pregnant women can be treated with 2 g of metronidazole in a single dose at any stage of pregnancy. The safety of tinidazole has not been fully established.

Treatment of all recent sexual partners is recommended because trichomoniasis is almost exclusively transmitted by sexual contact. The same twice-daily regimen of 500 mg of oral metronidazole is the primary treatment for bacterial vaginosis; however, the single 2-g oral dose is *not* recommended for treatment of bacterial vaginosis. Treatment of *Candida* vulvovaginitis with a single 150-mg dose of fluconazole is highly effective. Use of a topical agent depends on whether the case is considered complicated or uncomplicated. Only topical azole therapies, applied for 7 days, are recommended for use by pregnant women.

Prognosis

Bacterial vaginosis is treatable with various antibiotics, but the primary concern is failure of normal *Lactobacillus* flora to reestablish colonization in the vagina. This leads to repeated infections and necessitates prolonged treatment. Oral and vaginal administration of *Lactobacillus* bacteria is sometimes recommended. Bacterial vaginosis increases risk of infection with human immunodeficiency virus (HIV), herpes simplex virus type 2 (HSV-2), and *N. gonorrhoeae*, making treatment critical for the management of other STIs.

Other Causes of Nongonococcal Urethritis

There are several other known causes of urethritis and cervicitis and likely more that are unknown. Significant causes may include *Mycoplasma genitalium*, HSV, *Treponema pallidum*, adenovirus, and *Ureaplasma urealyticum*. *U. urealyticum* can be part of the normal flora, and its role in urethritis has not been validated.

The most common of these organisms is *M. genitalium*. It is a bacterium that lacks a cell wall, cannot be Gram stained, and is very difficult to grow in culture. The organism accounts for 15% to 25% of men with nongonococcal urethritis in the United States and is thought to be a cause of cervicitis and PID in women. Empirical treatment of symptomatic individuals includes azithromycin (1 g taken orally once) and doxycycline (100 mg orally twice daily for 7 days).

GENITAL ULCER DISEASE

Genital ulcers are a major manifestation of several STIs. Genital ulcers are best classified as painful (e.g., HSV, chancroid) or non-painful (e.g., syphilis). LGV due to *Chlamydia* also manifests with ulcerations. Ulcers may be classified as single (e.g., syphilis, chancroid) or multiple or grouped (e.g., HSV). All of these STIs manifest with diverse signs and symptoms, and clinical examination alone may be inadequate for accurate diagnosis (Table 100-1).

Syphilis

Definition and Epidemiology

Syphilis is caused by the spirochete *T. pallidum*, which can result in a wide spectrum of clinical disease. At the beginning of the 20th century, it was thought that an astounding 10% of the general population in the United States had syphilis. The CDC began reporting rates of syphilis in 1941. The rates peaked in the early 1940s at almost 600,000 cases and subsequently reached a