
Vaginitis

- Trichomoniasis
- Vulvovaginal Candidiasis (VVC)
- Bacterial Vaginosis (BV)

Vaginal Environment

- The vagina is a dynamic ecosystem that contains approximately 10^9 bacterial colony-forming units.
- Normal vaginal discharge is clear to white, odorless, and of high viscosity.
- Normal bacterial flora is dominated by lactobacilli – other potential pathogens present.
- Acidic environment (pH 3.8-4.2) inhibits the overgrowth of bacteria
- Some lactobacilli also produce H_2O_2 , a potential microbicide

Vaginitis

- Usually characterized by:
 - Vaginal discharge
 - Vulvar itching
 - Irritation
 - Odor
- Common types
 - Trichomoniasis (15%-20%)
 - Bacterial vaginosis (40%-45%)
 - Vulvovaginal candidiasis (20%-25%)

Other Causes of Vaginitis

- Mucopurulent cervicitis
- Herpes simplex virus
- Atrophic vaginitis
- Allergic reactions
- Vulvar vestibulitis
- Foreign bodies

Diagnosis of Vaginitis

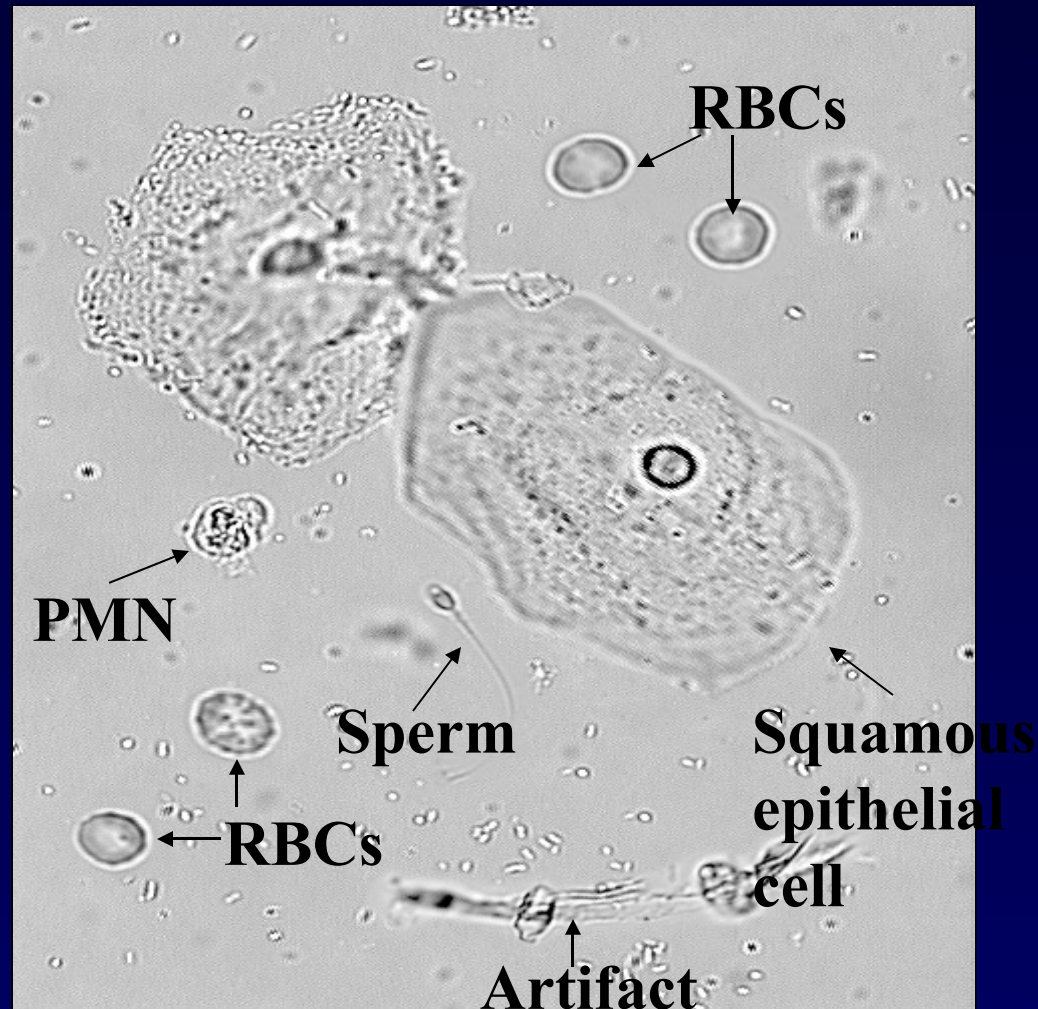
- Patient history
- Visual inspection of internal/external genitalia
- Appearance of discharge
- Collection of specimen
- Preparation and examination of specimen slide

Other Diagnostics for Vaginitis

- DNA probes
- Cultures
- Fem Examine Test Card™
- PIP Activity Test Card™

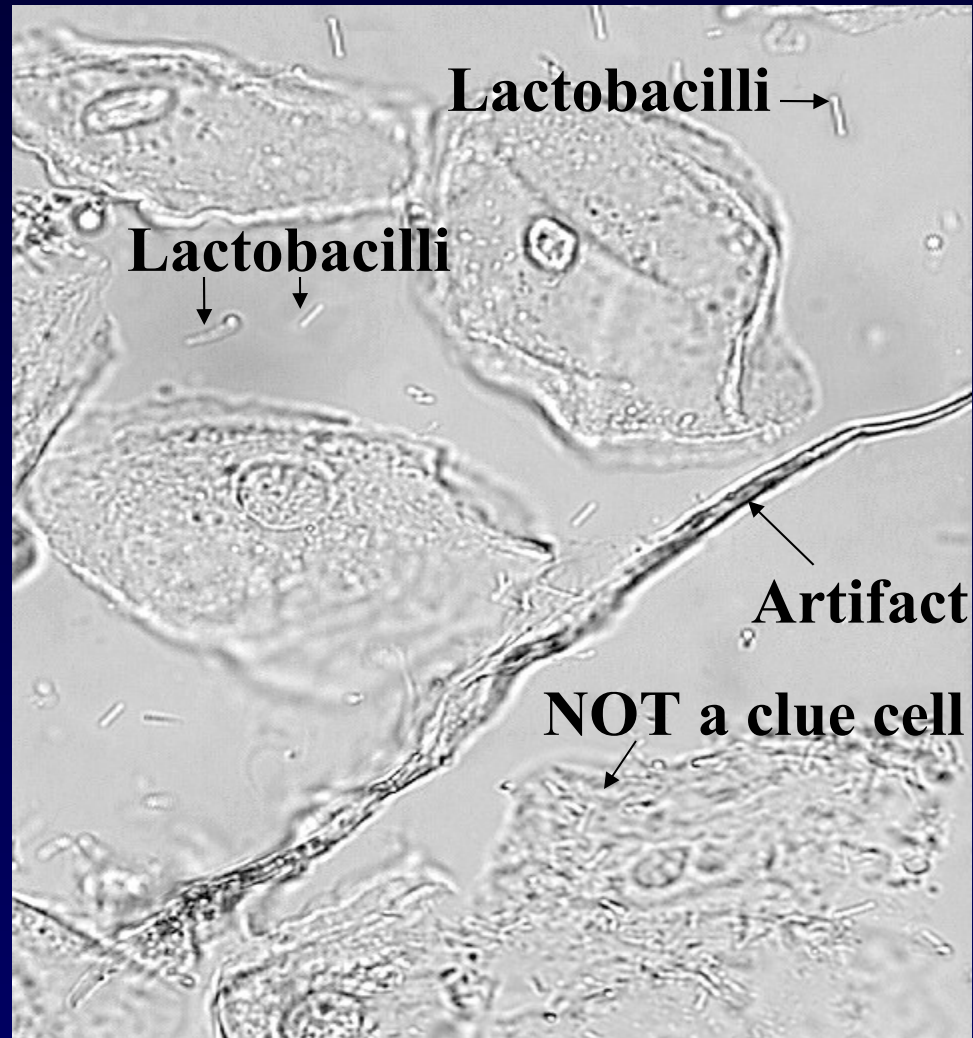
Wet Preps: Common Characteristics

Saline: 40X objective



Wet Prep: Lactobacilli and Epithelial Cells

Saline: 40X objective



Vaginitis Differentiation

	Normal	Trichomoniasis	Candidiasis	Bacterial Vaginosis
Symptom presentation		Itch, discharge, 50% asymptomatic	Itch, discomfort, dysuria, thick discharge	Odor, discharge, itch
Vaginal discharge	Clear to white	Frothy, gray or yellow-green; malodorous	Thick, clumpy, white "cottage cheese"	Homogenous, adherent, thin, milky white; malodorous "foul fishy"
Clinical findings		Cervical petechiae "strawberry cervix"	Inflammation and erythema	
Vaginal pH	3.8 - 4.2	> 4.5	Usually ≤ 4.5	> 4.5
KOH "whiff" test	Negative	Often positive	Negative	Positive
NaCl wet mount	Lacto-bacilli	Motile flagellated protozoa, many WBCs	Few WBCs	Clue cells ($\geq 20\%$), no/few WBCs
KOH wet mount			Pseudohyphae or spores if non- <i>albicans</i> species	

Vaginitis

Trichomonas vaginalis



Learning Objectives

Upon completion of this content, the learner will be able to:

1. Describe the epidemiology of trichomoniasis in the U.S.
2. Describe the pathogenesis of *T. vaginalis*.
3. Describe the clinical manifestations of trichomoniasis.
4. Identify common methods used in the diagnosis of trichomoniasis.
5. List CDC-recommended treatment regimens for trichomoniasis.
6. Describe patient follow up and partner management for trichomoniasis.
7. Describe appropriate prevention counseling messages for patients with trichomoniasis.

Lessons

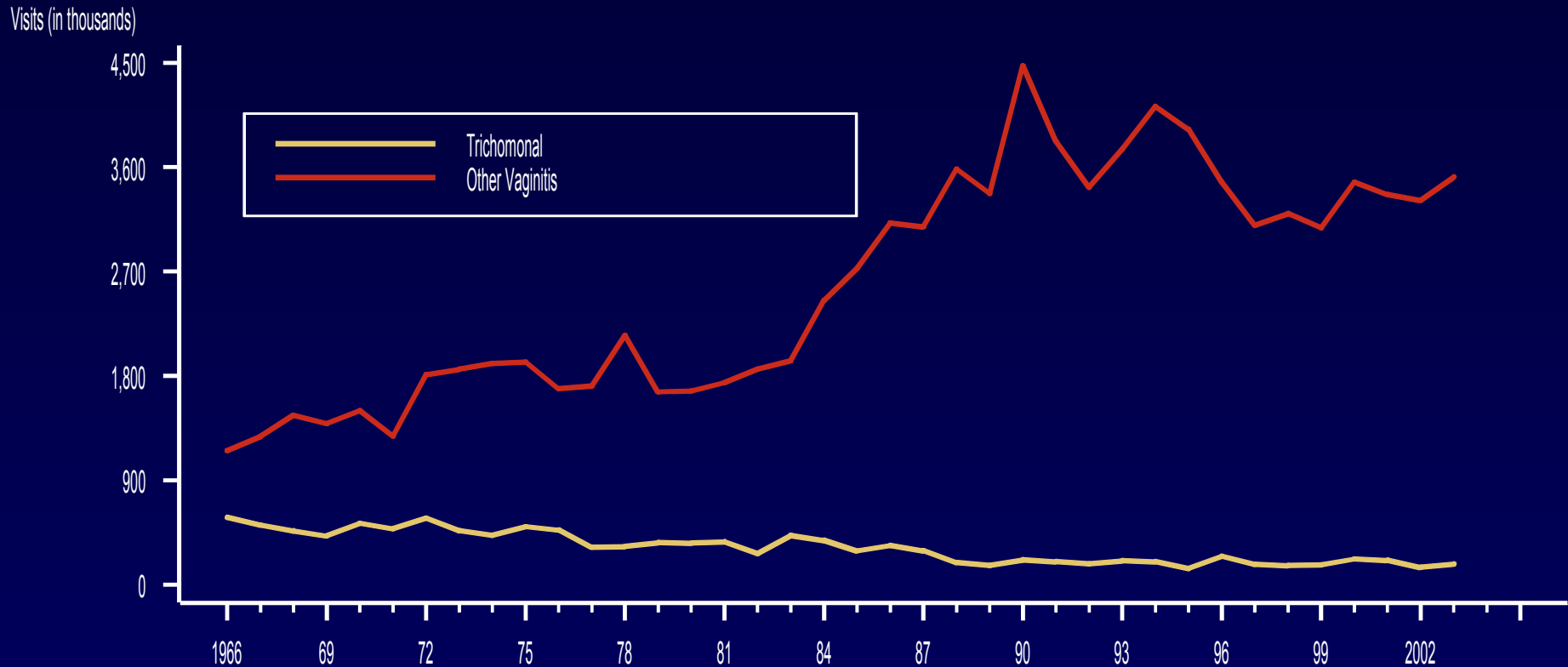
- I. Epidemiology: Disease in the U.S.
- II. Pathogenesis
- III. Clinical manifestations
- IV. Diagnosis
- V. Patient management
- VI. Prevention

Lesson I: Epidemiology: Disease in the U.S.

Incidence and Prevalence

- Most common treatable STD
- Estimated 7.4 million cases annually in the U.S. at a medical cost of \$375 million
- Estimated prevalence:
 - 2%-3% in the general female population
 - 50%-60% in female prison inmates and commercial sex workers
 - 18%-50% in females with vaginal complaints

Trichomoniasis and other vaginal infections — Initial visits to physicians' offices: United States, 1966–2003



SOURCE: National Disease and Therapeutic Index (IMS Health)

Risk Factors

- Multiple sexual partners
- Lower socioeconomic status
- History of STDs
- Lack of condom use

Transmission

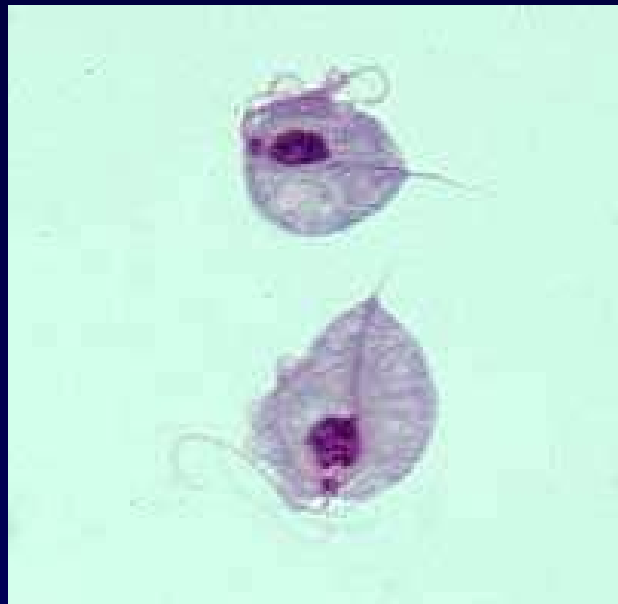
- Almost always sexually transmitted
- *T. vaginalis* may persist for months to years in epithelial crypts and periglandular areas
- Transmission between female sex partners has been documented

Lesson II: Pathogenesis

Microbiology

- Etiologic agent
 - *Trichomonas vaginalis* - flagellated anaerobic protozoa
 - Only protozoan that infects the genital tract
- Possible association with
 - Pre-term rupture of membranes and pre-term delivery
 - Increased risk of HIV acquisition

Trichomonas vaginalis



Lesson III: Clinical Manifestations

Clinical Presentation and Symptoms in Women

- May be asymptomatic in women
- Vaginitis
 - Frothy gray or yellow-green vaginal discharge
 - Pruritus
 - Cervical petechiae ("strawberry cervix") - classic presentation, occurs in minority of cases
- May also infect Skene's glands and urethra, where the organisms may not be susceptible to topical therapy

“Strawberry cervix” due to *T. vaginalis*



T. vaginalis in Men

- May cause up to 11%-13% of nongonococcal urethritis in males
- Urethral trichomoniasis has been associated with increased shedding of HIV in HIV-infected men
- Frequently asymptomatic

Lesson IV: Diagnosis

Diagnosis

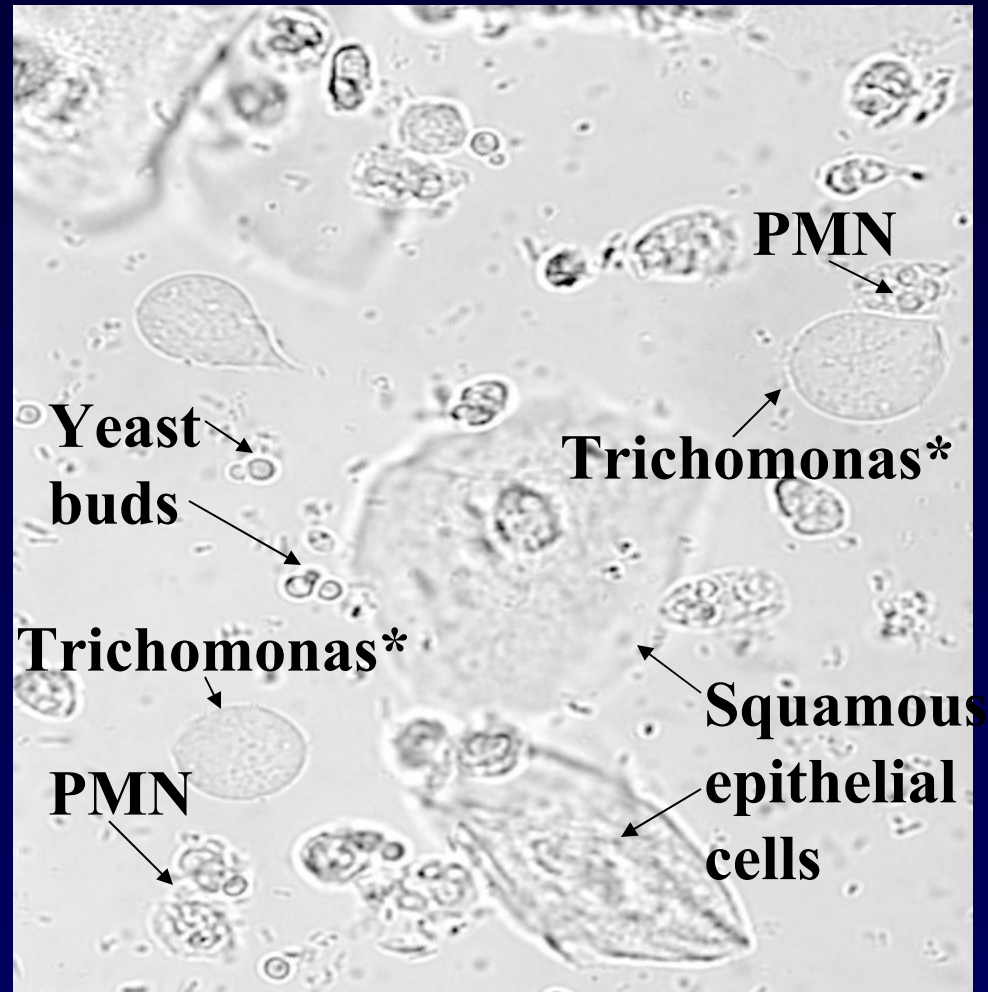
- **Motile** trichomonads seen on saline wet mount
- Vaginal pH >4.5 often present
- Positive amine test
- Culture is the “gold standard”

Diagnosis (continued)

- Pap smear has limited sensitivity and low specificity
- DNA probes
- Male diagnosis - Culture
 - First void urine concentrated
 - Urethral swab

Wet Prep: Trichomoniasis

Saline: 40X objective



*Trichomonas shown for size reference only: must be motile for identification
Source: Seattle STD/HIV Prevention Training Center at the University of Washington

Lesson V: Patient Management

Treatment

- CDC-recommended regimen
 - Metronidazole 2 g orally in a single dose
- CDC-recommended alternative regimen
 - Metronidazole 500 mg twice a day for 7 days
- No follow-up necessary

Pregnancy

- CDC-recommended regimen
 - Metronidazole 2 g orally in a single dose
- No evidence of teratogenicity

Treatment Failure

- If treatment failure occurs after 1 treatment attempt with both regimens, the patient should be retreated with metronidazole 2 g orally once a day for 3-5 days
- Assure treatment of sex partners
- If repeated treatment failures occur, contact the Division of STD Prevention, CDC, for metronidazole-susceptibility testing
 - 404-639-8363
 - www.cdc.gov/std

Lesson VI: Prevention

Partner Management

- Sex partners should be treated
- Patients should be instructed to avoid sex until they and their sex partners are cured (when therapy has been completed and patient and partner(s) are asymptomatic)

Patient Counseling and Education

- Nature of the disease
 - May be symptomatic or asymptomatic, douching may worsen vaginal discharge, untreated trichomoniasis associated with adverse pregnancy outcomes
- Transmission issues
 - Almost always sexually transmitted, fomite transmission rare, may persist for months to years, associated with increased susceptibility to HIV acquisition

Risk Reduction

The clinician should:

- Assess patient's potential for behavior change
- Discuss individualized risk-reduction plans with the patient
- Discuss prevention strategies such as abstinence, monogamy, use of condoms, and limiting the number of sex partners
- Latex condoms, when used consistently and correctly, can reduce the risk of transmission of *T. vaginalis*

Vaginitis

Vulvovaginal Candidiasis (VVC)



Learning Objectives

Upon completion of this content, the learner will be able to:

1. Describe the epidemiology of candidiasis in the U.S.
2. Describe the pathogenesis of candidiasis.
3. Describe the clinical manifestations of candidiasis.
4. Identify common methods used in the diagnosis of candidiasis.
5. List CDC-recommended treatment regimens for candidiasis.
6. Describe patient follow-up and partner management for candidiasis.
7. Summarize appropriate prevention counseling messages for patients with candidiasis.

Lessons

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Lesson I: Epidemiology: Disease in the U.S.

VVC Epidemiology

- Affects most females during lifetime
- Most cases caused by *C. albicans* (85%-90%)
- Second most common cause of vaginitis
- Estimated cost: \$1 billion annually in the U.S.

Transmission

- Candida species are normal flora of skin and vagina and are not considered to be sexually transmitted pathogens

Lesson II: Pathogenesis

Microbiology

- Candida species are normal flora of the skin and vagina
- VVC is caused by overgrowth of *C. albicans* and other non-albicans species
- Yeast grows as oval budding yeast cells or as a chain of cells (pseudohyphae)
- Symptomatic clinical infection occurs with excessive growth of yeast
- Disruption of normal vaginal ecology or host immunity can predispose to vaginal yeast infections

Lesson III: Clinical Manifestations

Clinical Presentation and Symptoms

- Vulvar pruritis is most common symptom
- Thick, white, curdy vaginal discharge ("cottage cheese-like")
- Erythema, irritation, occasional erythematous "satellite" lesion
- External dysuria and dyspareunia

Vulvovaginal Candidiasis



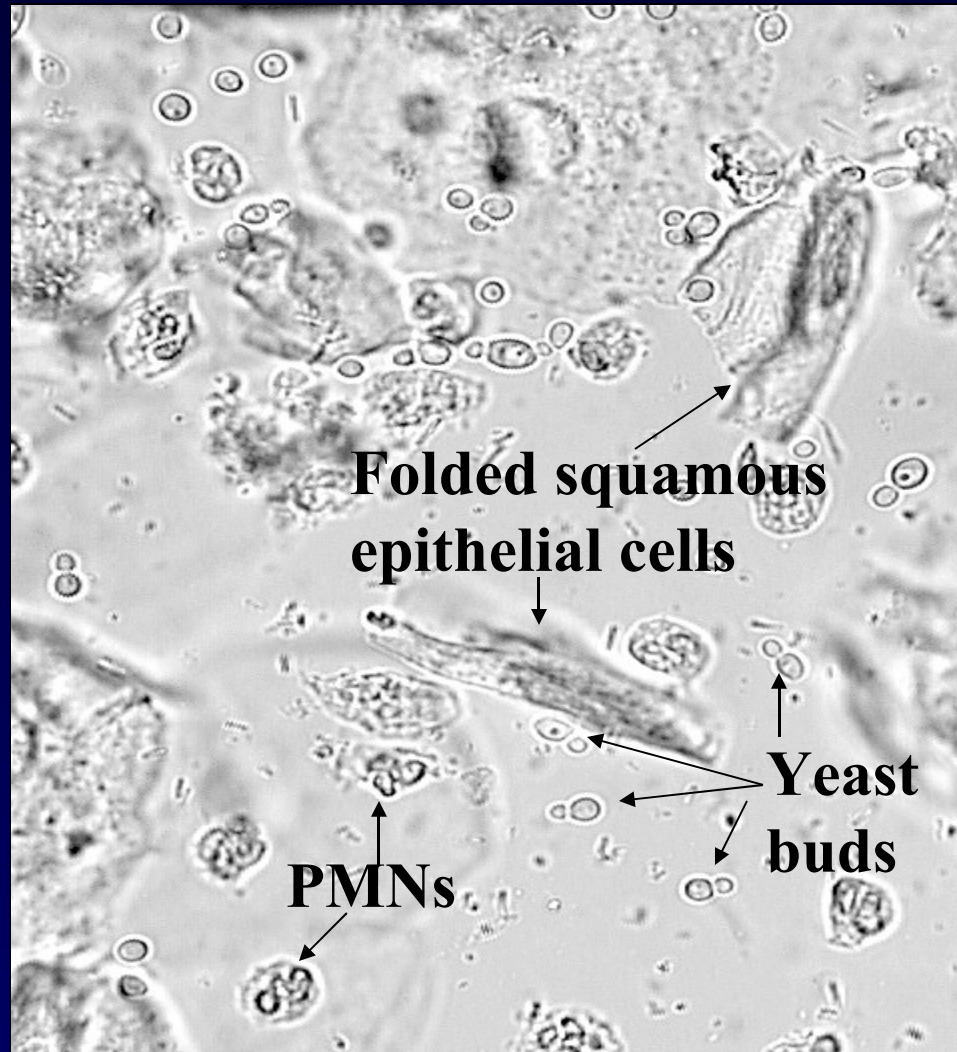
Lesson IV: Candidiasis Diagnosis

Diagnosis

- History, signs and symptoms
- Visualization of pseudohyphae (mycelia) and/or budding yeast (conidia) on KOH or saline wet prep
- pH normal (4.0 to 4.5)
 - If pH > 4.5, consider concurrent BV or trichomoniasis infection
- Cultures not useful for routine diagnosis

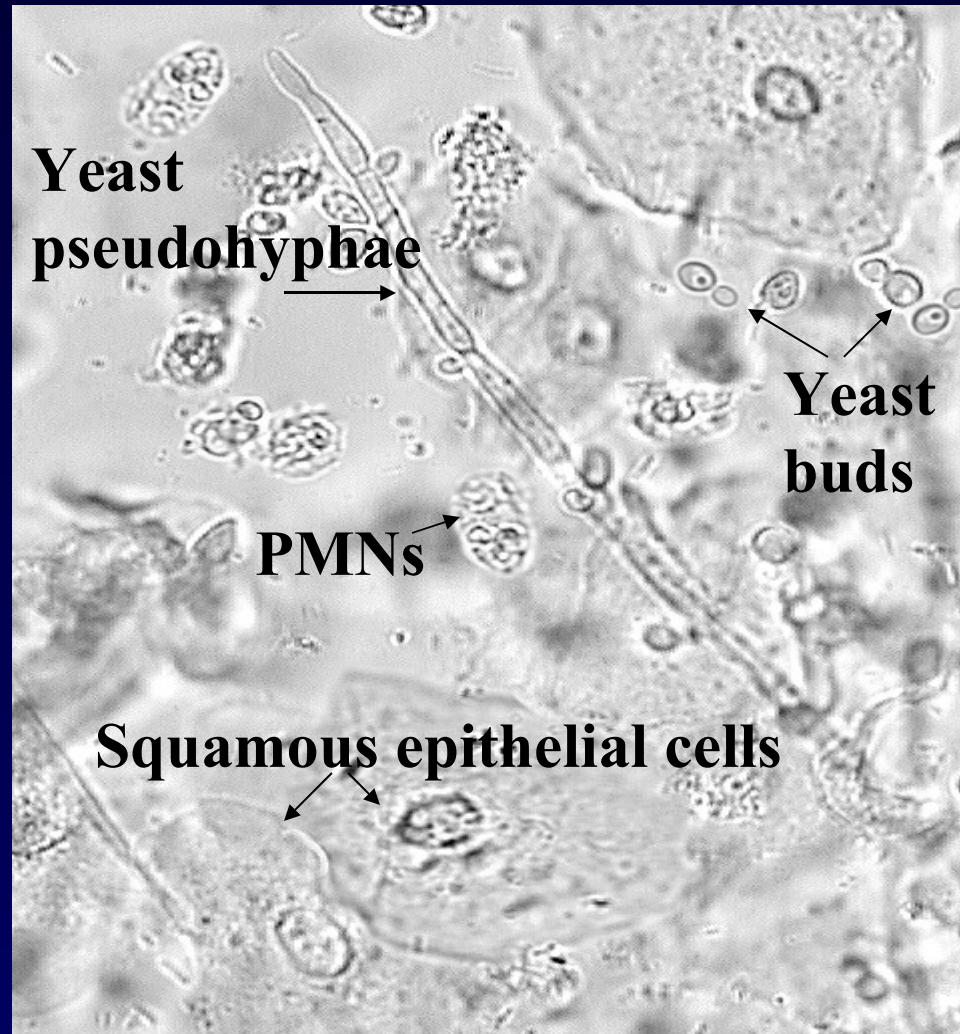
PMNs and Yeast Buds

Saline: 40X objective



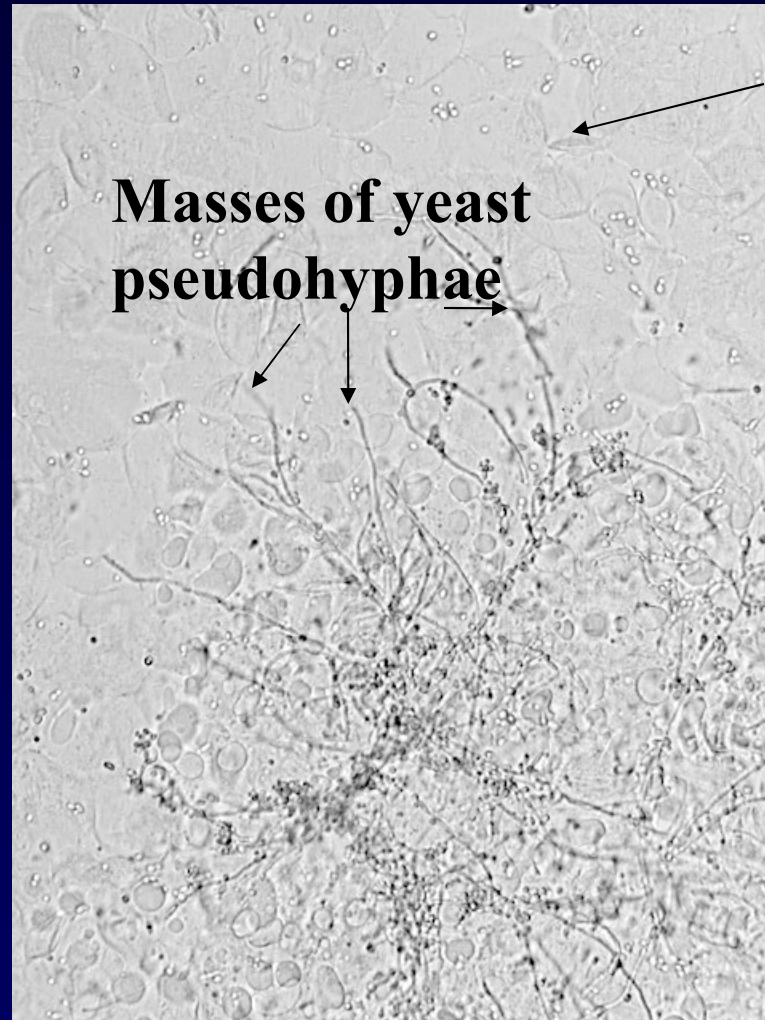
PMNs and Yeast Pseudohyphae

Saline: 40X objective



Yeast Pseudohyphae

10% KOH: 10X objective



Lysed
squamous
epithelial cell

Lesson V: Patient Management

Classification of VVC

Uncomplicated VVC

- Sporadic or infrequent vulvovaginal candidiasis
- Or
- Mild-to-moderate vulvovaginal candidiasis
- Or
- Likely to be *C. albicans*
- Or
- Non-immunocompromised women

Complicated VVC

- Recurrent vulvovaginal candidiasis (RVVC)
- Or
- Severe vulvovaginal candidiasis
- Or
- Non-albicans candidiasis
- Or
- Women with uncontrolled diabetes, debilitation, or immunosuppression or those who are pregnant

Uncomplicated VVC

- Mild to moderate signs and symptoms
- Non-recurrent
- 75% of women have at least one episode
- Responds to short course regimen

CDC-Recommended Treatment Regimens

- **Intravaginal agents:**
 - Butoconazole 2% cream, 5 g intravaginally for 3 days†
 - Butoconazole 2% sustained release cream, 5 g single intravaginally application
 - Clotrimazole 1% cream 5 g intravaginally for 7-14 days†
 - Clotrimazole 100 mg vaginal tablet for 7 days
 - Clotrimazole 100 mg vaginal tablet, 2 tablets for 3 days
 - Clotrimazole 500 mg vaginal tablet, 1 tablet in a single application
 - Miconazole 2% cream 5 g intravaginally for 7 days†
 - Miconazole 100 mg vaginal suppository, 1 suppository for 7 days†
 - Miconazole 200 mg vaginal suppository, 1 suppository for 3 days†
 - Nystatin 100,000-unit vaginal tablet, 1 tablet for 14 days
 - Tioconazole 6.5% ointment 5 g intravaginally in a single application†
 - Terconazole 0.4% cream 5 g intravaginally for 7 days
 - Terconazole 0.8% cream 5 g intravaginally for 3 days
 - Terconazole 80 mg vaginal suppository, 1 suppository for 3 days
- **Oral agent:**
 - Fluconazole 150 mg oral tablet, 1 tablet in a single dose

Note: The creams and suppositories in this regimen are oil-based and may weaken latex condoms and diaphragms. Refer to condom product labeling for further information.

† Over-the-counter (OTC) preparations.

Complicated VVC

- Recurrent (RVVC)
 - Four or more episodes in one year
- Severe
 - Edema
 - Excoriation/fissure formation
- Non-albicans candidiasis
- Compromised host
- Pregnancy

Complicated VVC Treatment

- Recurrent VVC (RVVC)
 - 7-14 days of topical therapy, or
 - 150 mg oral dose of fluconazole repeated 3 days later
 - Maintenance regimens (see CDC STD treatment guidelines)
- Severe VVC
 - 7-14 days of topical therapy, or
 - 150 mg oral dose of fluconazole repeated in 72 hours

Complicated VVC Treatment (continued)

- Non-albicans
 - Optimal treatment unknown
 - 7-14 days non-fluconazole therapy
 - 600 mg boric acid in gelatin capsule vaginally once a day for 14 days
- Compromised host
 - 7-14 days of topical therapy

Lesson VI: Prevention

Partner Management

- VVC is not usually acquired through sexual intercourse.
- Treatment of sex partners is not recommended but may be considered in women who have recurrent infection.
- A minority of male sex partners may have balanitis and may benefit from treatment with topical antifungal agents to relieve symptoms.

Patient Counseling and Education

- Nature of the disease
 - Normal vs. abnormal vaginal discharge, signs and symptoms of candidiasis, maintain normal vaginal flora
- Transmission Issues
 - Not sexually transmitted
- Risk reduction
 - Avoid douching, avoid unnecessary antibiotic use, complete course of treatment

Vaginitis

Bacterial Vaginosis (BV)



Learning Objectives

Upon completion of this content, the learner will be able to:

1. Describe the epidemiology of bacterial vaginosis in the U.S.
2. Describe the pathogenesis of bacterial vaginosis.
3. Describe the clinical manifestations of bacterial vaginosis.
4. Identify common methods used in the diagnosis of bacterial vaginosis.
5. List CDC-recommended treatment regimens for bacterial vaginosis.
6. Describe patient follow up and partner management for patients with bacterial vaginosis.
7. Summarize appropriate prevention counseling messages for patients with bacterial vaginosis.

Lessons

- I. Epidemiology: Disease in the U.S.
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Lesson I: Epidemiology: Disease in the U.S.

Epidemiology

- Most common cause of vaginitis
- Prevalence varies by population:
 - 5%-25% among college students
 - 12%-61% among STD patients
- Widely distributed

Epidemiology (continued)

- Linked to premature rupture of membranes, premature delivery and low birth-weight delivery, acquisition of HIV, development of PID, and post-operative infections after gynecological procedures
- Organisms do not persist in the male urethra

Risk Factors

- African American
- Two or more sex partners in previous six months/new sex partner
- Douching
- Absence of or decrease in lactobacilli
- Lack of H₂O₂-producing lactobacilli

Transmission

- Currently not considered a sexually transmitted disease, but acquisition appears to be related to sexual activity

Lesson II: Pathogenesis

Microbiology

- Overgrowth of bacteria species normally present in vagina with anaerobic bacteria
- BV correlates with a decrease or loss of protective lactobacilli:
 - Vaginal acid pH normally maintained by lactobacilli through metabolism of glucose/glycogen
 - Hydrogen peroxide (H_2O_2) is produced by some *Lactobacilli*,sp.
 - H_2O_2 helps maintain a low pH, which inhibits bacteria overgrowth
 - Loss of protective lactobacilli may lead to BV

H₂O₂ -Producing Lactobacilli

- All lactobacilli produce lactic acid
- Some species also produce H₂O₂
- H₂O₂ is a potent natural microbicide
- Present in 42%-74% of females
- Thought to be toxic to viruses like HIV

Lesson III: Clinical Manifestations

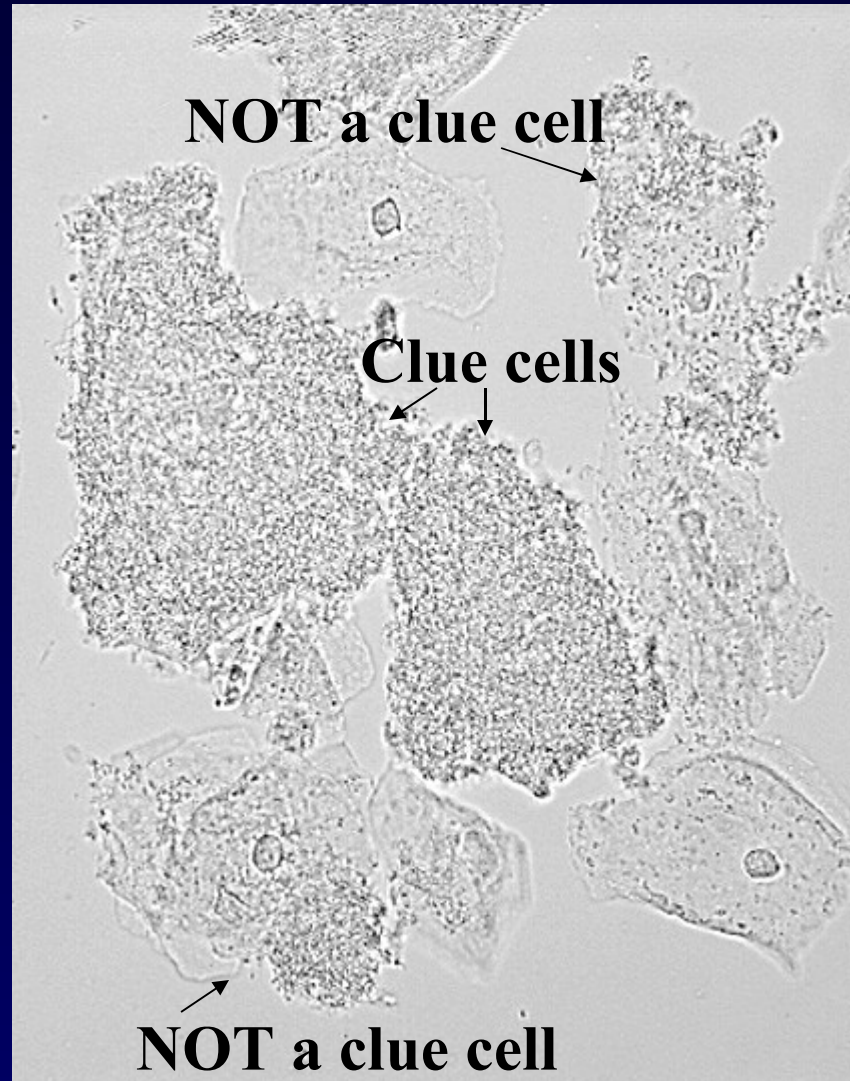
Clinical Presentation and Symptoms

- 50% asymptomatic
- Signs/symptoms when present:
 - 50% report malodorous (fishy smelling) vaginal discharge
 - Reported more commonly after vaginal intercourse and after completion of menses

Lesson VI: Diagnosis

Wet Prep: Bacterial Vaginosis

Saline: 40X objective



BV Diagnosis: Amsel Criteria

Amsel Criteria:
Must have at least
three of the
following findings:

- Vaginal pH >4.5
- Presence of >20% per HPF of "clue cells" on wet mount examination
- Positive amine or "whiff" test
- Homogeneous, non-viscous, milky-white discharge adherent to the vaginal walls

Other Diagnostic Tools

- Vaginal Gram stain (Nugent criteria)
- Culture
- DNA probe
- Newer diagnostic modalities include:
 - FemExam™
 - PIP Activity TestCard™

Lesson V: Patient Management

Treatment

CDC-recommended regimens:

- Metronidazole 500 mg orally twice a day for 7 days, OR
- Metronidazole gel 0.75%, one full applicator (5 grams) intravaginally, once a day for 5 days, OR
- Clindamycin cream 2%, one full applicator (5 grams) intravaginally at bedtime for 7 days

Alternative regimens:

- Metronidazole 2 g orally in a single dose, OR
- Clindamycin 300 mg orally twice a day for 7 days, OR
- Clindamycin ovules 100 g intravaginally once at bedtime for 3 days

Treatment in Pregnancy

- Pregnant women with symptomatic disease should be treated with
 - Metronidazole 250 mg orally 3 times a day for 7 days, OR
 - Clindamycin 300 mg orally twice a day for 7 days
- Asymptomatic high-risk women (those who have previously delivered a premature infant)
 - May be screened at first prenatal visit
 - Follow up 1 month after completion of therapy

Screening and Treatment in Asymptomatic Patients

- Asymptomatic screening of low-risk pregnant women is not recommended.
- Therapy is not recommended for male partners of women with BV.
- Female partners of women with BV should be examined and treated if BV is present.
- Screen and treat women prior to surgical abortion or hysterectomy.

Recurrence

- 20% recurrence rate after 1 month
- Recurrence may be a result of persistence of BV-associated organisms and failure of lactobacillus flora to recolonize.
- Data do not support yogurt therapy or exogenous oral lactobacillus treatment.
- Under study: vaginal suppositories containing human lactobacillus strains

Lesson VI: Prevention

Partner Management

- After multiple occurrences, some consider empiric treatment of male sex partners to see if recurrence rate diminishes, but this approach has not been validated.

Patient Counseling and Education

- Nature of the Disease
 - Normal vs. abnormal discharge, malodor, BV signs and symptoms, sexually associated
- Transmission Issues
 - Not sexually transmitted between heterosexuals, high association in female same-sex partnerships
- Risk Reduction
 - Avoid douching
 - Limit number of sex partners

Case Study



History

Tanya Walters

- 24-year-old single female
- Presents with complaints of a smelly, yellow vaginal discharge and slight dysuria for 1 week
- Denies vulvar itching, pelvic pain, or fever
- 2 sex partners during the past year—did not use condoms with these partners—on oral contraceptives for birth control
- No history of sexually transmitted diseases, except for trichomoniasis 1 year ago
- Last check up 1 year ago

Physical Exam

- Vital signs: blood pressure 112/78, pulse 72, respiration 15, temperature 37.3° C
- Cooperative, good historian
- Chest, heart, breast, musculoskeletal, and abdominal exams within normal limits
- No flank pain on percussion
- Normal external genitalia with a few excoriations near the introitus, but no other lesions
- Speculum exam reveals a moderate amount of frothy, yellowish, malodorous discharge, without visible cervical mucopus or easily induced cervical bleeding
- Bimanual examination was normal without uterine or adnexal tenderness

Questions

1. What is your differential diagnosis based on history and physical examination?
2. Based on the differential diagnosis of vaginitis, what is the etiology?
3. Which laboratory tests should be offered or performed?

Laboratory Results

- Vaginal pH -- 6.0
- Saline wet mount of vaginal secretions -- numerous motile trichomonads and no clue cells
- KOH wet mount -- negative for budding yeast and hyphae

4. What may one reasonably conclude about Tanya's diagnosis?

5. What is the appropriate CDC-recommended treatment for this patient?



Partner Management



Jamie

- Last sexual contact: 2 days ago
- First sexual contact: 2 months ago
- Twice a week, vaginal sex

Calvin

- Last sexual contact: 6 months ago
- First sexual contact: 7 months ago
- 3 times a week, vaginal and oral sex

6. How should Jamie and Calvin be managed?

Follow-Up

- Tanya was prescribed metronidazole 2 g orally, and was instructed to abstain from sexual intercourse until her partner was treated.
 - She returned two weeks later. She reported taking her medication, but had persistent vaginal discharge that had not subsided with treatment. She reported abstinence since her clinic visit, and her partner had moved out of the area. Her tests for chlamydia and gonorrhea were negative.
 - The vaginal wet mount again revealed motile trichomonads.
5. What is the appropriate therapy for Tanya now?
 6. What are appropriate prevention recommendations for Tanya?