Vaginitis and Vaginosis
Diagnosis and Treatment

Susan Blank, MD MPH (sblank@health.nyc.gov)
Elizabeth M. Alderman, MD
Professor of Clinical Pediatrics
Albert Einstein College of Medicine
Children's Hospital at Montefiore
ealderma@montefiore.org

REGION II STD HIV PREVENTION TRAINING CENTER

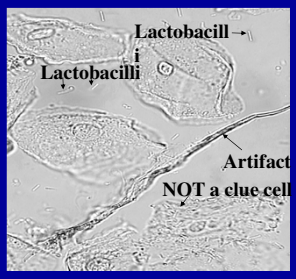
NYC Health

Vaginal Microflora

- Complex and Dynamic
  - Changes in vaginal microflora occur with:
    - menses
    - intercourse
    - antibiotic usage
    - estrogen levels
    - feminine hygiene products
- Lactobacillus species are predominant
  - Aerobic, gram positive rod, motile
  - Several types of lactobacilli produce hydrogen peroxide (H_2O_2)
    - In vitro peroxide producing lactobacilli found to be toxic to HIV and to *Gardnerella vaginalis*
  - Maintains a protective acidic environment

NYC Health

Wet Prep: Normal Vagina



Saline: 40X objective

Source: Seattle STD/HIV Prevention Training Center at the University of Washington

NYC Health

Other Vaginal Bacteria

- Even women with lactobacilli-predominant vaginal flora
  - 46% colonized with *G. vaginalis*
  - 78% colonized with *Ureaplasma urealyticum*
  - 31% colonized with *Candida albicans*
- Other species include
  - Diptheroids
  - Bacillus sp.
  - Staphloccous aureus
  - Streptococcus viridans
  - Enterococcus

NYC Health

Vaginal pH

- Dynamic and shifting
- Determinants of vaginal pH:
  - Age/estrogen levels
  - Proportion of lactobacilli in vaginal flora
  - Menses
  - Sexual intercourse
- Normal pH for women of reproductive age=3.8-4.5

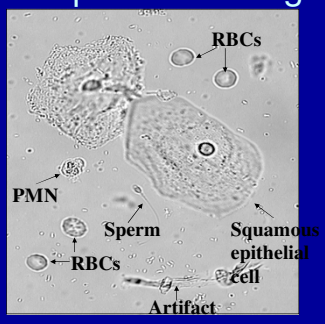
NYC Health

Vaginal Discharge - Normal

- Composition
  - Cervical and vaginal epithelium
  - Normal bacterial flora, water, electrolytes
- Quantity and quality varies hormonally
  - White or clear
  - Odorless
  - pH ≤ 4.5 (3.8-4.5)
  - Non-homogenous, floccular

NYC Health

Wet Prep: Normal Vagina



Saline: 40X objective

Source: Seattle STD/HIV Prevention Training Center at the University of Washington

Vaginitis: Diversity vs. Pathology

- "Normal" flora vs. "optimal" flora
- "In the real world, a normal (i.e. lactobacilli-predominant vaginal flora) is not the norm"
- Racial and geographic variation
- When /why is non-lactobacilli predominant flora pathological?
  - Symptoms?
  - Risk for other morbidity?

Why worry about vaginitis?

Its *only* vaginitis….or is it?

- Increased susceptibility to HIV infection
- Association with other morbidity
- Symptoms
- Cost

Vaginitis: Associated Morbidity

- Bacterial vaginosis and trichomonas vaginalis in pregnancy are associated with:
  - Prematurity
  - Chorioamnionitis
  - Low birth weight
- Other associated morbidity
  - Pelvic Inflammatory Disease
  - Pelvic infection following obstetrical or gynecological surgery

Symptoms of Vaginitis

- Vaginal discharge
- Vulvar itching
- Irritation
- Redness
- Odor
- Pain
- Dyspareunia

Cost of Vaginitis

- 10 million office visits per year
- Trichomonas vaginitis
  - Estimated 7.4 million cases annually in the U.S. at a medical cost of $375 million
- Candida vulvovaginitis

Infectious Causes of Vulvovaginitis

- Vulvovaginitis/Vaginosis
  - Bacterial Vaginosis
  - Trichomoniasis
  - Vulvovaginal candidiasis
- Mucopurulent cervicitis with increased discharge and other vaginal symptoms
  - Neisseria gonorrhea
  - Chlamydia

Benefits of Treatment of Vaginitis

- Decreases the rate of HIV transmission
- Decreases poor pregnancy outcomes
- Decreases surgical morbidity
- Addresses the elimination of health disparities

Effective treatment requires accurate diagnosis

Clinical Diagnosis of Vaginitis

- Patient history
- Visual inspection of internal/external genitalia
- Appearance of discharge
- pH of discharge
- Whiff test (KOH)

Bacterial Vaginosis
Etiology

- Replacement of the normal H_2O_2 producing Lactobacillus by a pathogen
- Common bacteria in BV:
  - *Gardnerella vaginalis*
  - *Mycoplasm hominus*
  - *Mobiluncus* species

Laboratory Diagnosis of Vaginitis

- Wet mount
- Culture
- Gram stain
- DNA probes
- New Point of Care Tests

Bacterial Vaginosis
Prevalence

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

Variables Associated with BV

- Previous pregnancy
- No hormonal contraception
- Douching
- Black race
- Two or more sex partners in previous six months/new sex partner
- Absence of or decrease in H_2O_2 – producing lactobacilli
- Women who have sex with women
- History of *trichomonas*

Bacterial Vaginosis
Transmission

- Currently not considered a sexually transmitted disease
  - Acquisition appears to be related to sexual activity
    - Semen alters pH of vagina
  - Rare among women who have never had vaginal-penile sex or genital sex

Bacterial Vaginosis
Clinical Presentation and Symptoms

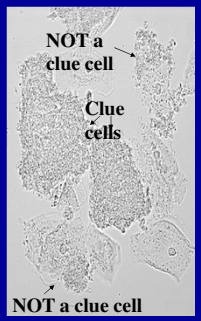
- 50% asymptomatic
- Signs/symptoms when present:
  - 50% report malodorous (fishy smelling) vaginal discharge
  - Itching
  - Irritation
  - Odor
- Reported more commonly after vaginal intercourse and after completion of menses

Bacterial Vaginosis
Diagnosis

- Thin, white, homogeneous discharge
- pH > 4.5
- Positive amine test (fishy odor)

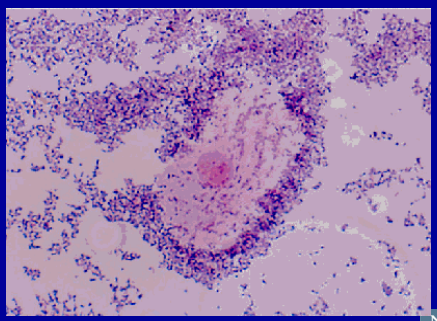
Bacterial Vaginosis
Diagnosis

Saline: 40X objective



Source: Seattle STD/HIV Prevention Training Center at the University of Washington

Bacterial Vaginosis
Diagnosis



Gram Stain of Clue Cell

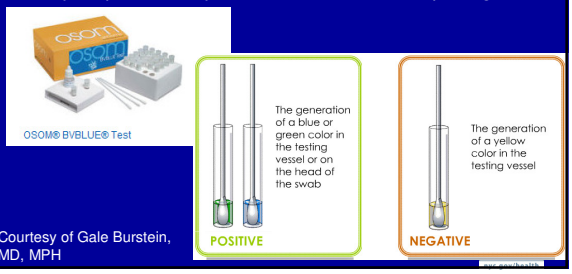
Bacterial Vaginitis
Amsel Criteria

Must have three of the following:

- 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

CLIA Waived-Point of Care Test for BV
OSOM BVBLUE Test
(Genzyme Diagnostics, Cambridge, Massachusetts)

- Detects elevated vaginal fluid sialidase activity
  - enzyme produced by BV-associated bacterial pathogens



Courtesy of Gale Burstein, MD, MPH

BV: Who to screen? Who to treat?

- Non pregnant women
  - Symptomatic women
  - Female partners of women with BV
  - Women prior to surgical abortion or hysterectomy

Bacterial Vaginosis
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
- **CDC-recommended alternative regimens:**
  - Tinidazole 2 g orally once daily for 2 days
    OR
    Tinidazole 1 g orally once daily for 5 days
    (expensive co-payment)
  - Clindamycin 300 mg orally twice a day for 7 days, OR
  - Clindamycin ovules 100 g intravaginally once at bedtime for 3 days

http://www.cdc.gov/std/treatment/2010/default.htm

BV and Pregnancy

- Associated with
  - Spontaneous abortion
  - Preterm delivery
  - Chorioamnionitis
  - Endometritis after c-section or vaginal delivery

Screening Pregnant Women for BV

- All symptomatic pregnant women
- Asymptomatic with history of preterm labor without symptoms
  - Screen at first prenatal visit
  - If positive, treat and check for cure one month after treatment
- Screening of asymptomatic low-risk pregnant women is not recommended.

Bacterial Vaginosis
Management in Pregnancy

- Pregnant women with symptomatic disease should be treated with
  - Metronidazole 250 mg orally 3 times a day for 7 days, OR
  - Metronidazole 500 mgs orally twice a day for 7 days
  - Clindamycin 300mgs orally twice a day for 7 days

http://www.cdc.gov/std/treatment/2010/default.htm

Trichomonas Vaginalis
Prevalence

- Most common treatable STD
- Underestimate since trichomonas is not reportable
- 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

Trichomonis Vaginalis
Risk factors

- Change in sexual partners
- Three partners or more in previous month
- Infection with another STD

Trichomonas Vaginalis
Etiology

- *Trichomonas vaginalis*
  - flagellated anaerobic protozoa
  - *Trichomonas vaginalis* - only protozoan that infects the genital tract
  - causes urethritis in men & vaginitis in women

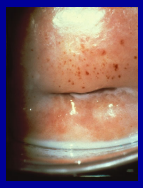
Trichomonas Vaginalis
Transmission

- 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

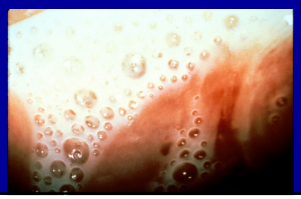
Trichomoniasis
Clinical Presentation

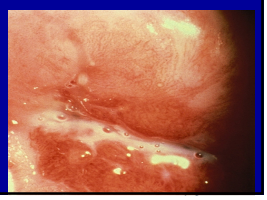
- 50 percent are symptomatic
- 50 percent of infected women are asymptomatic
  - 30 percent will become symptomatic within six months
- Difficult to differentiate between persistent vs. subclinical infections

Trichomoniasis
Clinical Diagnosis



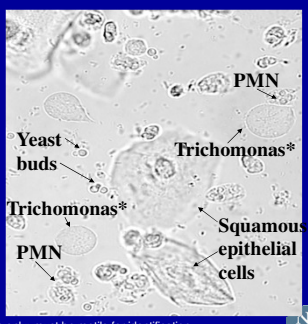
Discharge
- frothy
- yellow-green
- malodorous
- pH >5.0
- Amine test/Whiff test: fishy odor may be present





Trichomoniasis
Wet Prep

Saline: 40X objective

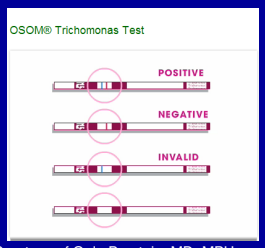


*Trichomonas shown for size reference only: must be motile for identification
Source: Seattle STD/HIV Prevention Training Center at the University of Washington

CLIA Waived-Point of Care Test
OSOM Trichomonas Rapid Test

(*Genzyme Diagnostics, Cambridge, Massachusetts*)

- Immunochromatographic capillary flow dipstick technology



Courtesy of Gale Burstein, MD, MPH

Test for Trichomonas, GC and Chlamydia

- APTIMA *Trichomonas vaginalis* Assay (Gen-Probe Inc, San Diego, CA)
- Can perform GC/CT/TV on 1 specimen

Specimen Type	Sensitivity % (95% CI)[1]	Specificity % (95% CI)[1]
Vaginal swab	100 (96.7-100)	99.0 (97.9-99.5)
Endocervical swab	100 (96.7-100)	99.4 (98.6-99.7)
PreservCyt solution	100 (96.0-100)	99.6 (98.8-99.9)
Female urine	95.2 (88.4-98.1)	98.9 (97.8-99.5)

[1] APTIMA *Trichomonas vaginalis* Assay [package insert]. San Diego, CA: Gen-Probe; 2011.

Courtesy of Gale Burstein, MD, MPH

Trichomoniasis
Diagnosis

Test type	Sensitivity
• PCR (tests for GC/Chlm, too)	74-98%
• Vaginal microscopy	60 - 70%
• Culture	>90%
▪ Diamond's modified media	
▪ InPouchTV	
• Point of Care Tests	
▪ Osom ready in 10 minutes	>83%
▪ Affirm VP III ready in 45 minutes	>83%

Men - Wet prep insensitive, culture testing of urethral swab, urine and semen required for optimal sensitivity*

Trichomoniasis
Management

- CDC Recommended Treatment
  - Metronidazole 2 grams orally in a single dose
    or
  - Tinidazole 2 grams orally in a single dose
    - If treat for 2 days, covers BV, too
    - Cannot use in pregnancy
- CDC Alternative Treatment
  - Metronidazole 500mg orally twice a day for seven days

http://www.cdc.gov/std/treatment/2010/vaginal-discharge.htm#a1

Treatment Failures with Metronidazole 2g

Note - Low-level metronidazole resistance in 2%-5% of cases*

1st re-treatment

Metronidazole 500mg PO BID x 7d or Tinidazole 2g PO x OD

2nd re-treatment

Tinidazole or Metronidazole 2g PO QD x 5days

3rd re-treatment

culture and sensitivity consult ID or CDC

2006 STD Treatment Guidelines

NYC Health

Trichomoniasis in Pregnancy
Management

Association with adverse outcomes clearly documented but benefit of treatment in reducing perinatal morbidity is not established.

- Symptomatic
  - Counsel regarding risks/benefits of treatment
  - Metronidazole 2 grams (category B) recommended
  - Tinidazole (category C) safety not established-do not use
- Asymptomatic
  - No evidence of reduction in perinatal mortality
  - ?Increase in prematurity (after metronidazole tx)
  - Screening not recommended

NYC Health

Trichomonas Vaginalis
Management of Sex Partners

- Treat sex partners
- Advise to avoid sex with partners until completion of treatment and resolution of symptoms

NYC Health

Candida Vulvovaginitis
Etiology

- Candida species are normal flora of the skin and vagina
- Caused by overgrowth of *C. albicans* and other non-albicans species
- Source of candida is skin and adjacent perianal area

NYC Health

Candida Colonization in Adolescents

- 153 teens at an adolescent clinic
  - 84% were sexually active
  - Mean age 15.4 years old
  - 85 % African American
- 24% of sexually active teens had asymptomatic yeast colonization compared with 4% of non-sexually active teens
- Among sexually active teens, candida colonization was not effected by douching, condom use, or hormonal contraception

NYC Health

Candidal Vulvovaginitis
Predisposing factors

- Pregnancy
- Contraceptives
  - Conflicting data
- Poorly controlled diabetes
- Antibiotics
  - Conflicting data
    - Most women who take antibiotics do not get CVV
    - Most cases of CVV are not associated with antibiotic use

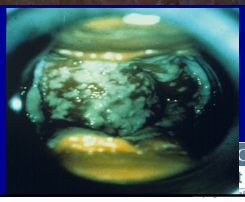
NYC Health

Candidal Vulvovaginitis
Transmission

- Candida species are normal flora of skin and vagina
  - not considered to be sexually transmitted pathogens
- Some evidence of role for sexual transmission
  - Asymptomatic male genital colonization is 4x more common in male partners of infected women
  - Possible role of orogenital and anogenital sex in transmission

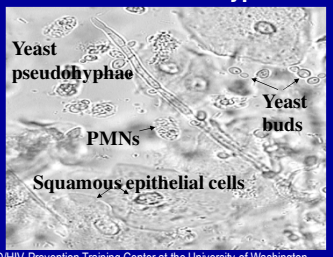
Candidal Vulvovaginitis
Diagnosis

- Pruritis
- Vulvovaginal swelling
- Dysuria
- Thick, white, curdy discharge
- Occasional erythematous "satellite" lesion



Candidal Vulvovaginitis
Diagnosis

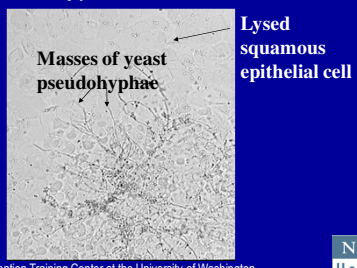
- **Saline: 40X objective**
- **PMNs and Yeast Pseudo hyphae**



Source: Seattle STD/HIV Prevention Training Center at the University of Washington

Candidal Vulvovaginitis
Diagnosis

- 10% KOH: 10X objective
- Yeast Pseudohyphae



Source: Seattle STD/HIV Prevention Training Center at the University of Washington

How Can I Test for All 3????

- Affirm™ VP III (Becton Dickinson, San Jose, CA)
  - *T. vaginalis*, *G. vaginalis*, and *C. albicans* nucleic acid probe test
  - FDA approved as moderate complexity so not CLIA waved
  - Must be done by your lab

Candidal Vulvovaginitis
Management

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

Candidal Vulvovaginitis
Management

- **Intravaginal agents:**
  - Butoconazole 2% cream, 5 g intravaginally for 3 days†
  - Butoconazole 2% sustained release cream, 5 g single intravaginally application (Rx)
  - Clotrimazole 1% cream 5 g intravaginally for 7-14 days
  - Clotrimazole 2% cream 5 g intravaginally for 3 days
  - Miconazole 2% cream 5 g intravaginally for 7 days
  - Miconazole 4% cream 5g intravaginally for 3 days
  - Miconazole 100 mg vaginal suppository, 1 suppository for 7 days
  - Miconazole 200 mg vaginal suppository, 1 suppository for 3 days
  - Miconazole1200mg vaginal suppository, once
  - Nystatin 100,000-unit vaginal tablet, 1 tablet for 14 days (Rx)
  - Tioconazole 6.5% ointment 5 g intravaginally in a single application†
  - Terconazole 0.4% cream 5 g intravaginally for 7 days (Rx)
  - Terconazole 0.8% cream 5 g intravaginally for 3 days (Rx)
  - Terconazole 80 mg vaginal suppository, 1 suppository for 3 days (Rx)
- **Oral agent:**
  - Fluconazole 150 mg oral tablet, 1 tablet in a single dose

http://www.cdc.gov/std/treatment/2010/vaginal-discharge.htm#a1

Recurrent Candidal Vulvovaginitis
Management

- Four or more episodes in one year
- Culture to identify non-albicans candidiasis
- Treatment (specialist recommended, not official CDC recommendations)
  - Longer initial treatment
    - Topical therapy for 7-14 days
      or
    - Fluconazole 100mg, 150mg or 200 mg dose every third day for three days for total of three doses
  - Maintenance regimen
    - Oral fluconazole 100mg, 150mg or 200 mg weekly x 6 months
      or
    - Topical treatment once or twice weekly

http://www.cdc.gov/std/treatment/2010/vaginal-discharge.htm#a1

Severe Candidal Vulvovaginitis
Treatment

- Extensive vulvar erythema
- Edema
- Excoriation'
- Fissure formation
- Treatment
  - 7-14 days of topical therapy, or
  - 150 mg oral dose of fluconozole repeated in 72 hours

Other Complicated Candidal Vulvovaginitis

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

Non-infectious Causes of Vaginitis

- Atrophic vaginitis
- Lichen planus
- Lichen simplex
- Chemicals: douches, deodorants, detergents
- Allergies: China brush, latex, N-9
- Contact dermatitis, e.g. poison ivy
- Presence of foreign body

Contact Dermatitis in Anovaginal Area

- Chemical-direct effect
  - Immediate reaction
- Allergic dermatitis
  - 48-72 hours

- Thank you
  - Anne Lifflander, MD, MPH
  - Gale Burstein, MD, MPH

Bibliography: Vaginitis & HIV

1. Shin and Kaul, Say it with flora: maintaining vaginal health as a possible avenue for prevention of human immunodeficiency virus acquisition, JID 2008;197:1355-7.
2. Martin et al., Vaginal lactobacilli, microbial flora, and risk of Human Immunodeficiency Virus Type 1 and sexually transmitted disease acquisition, JID 1999; 180:1863:8.
3. Wang et al., The effect of treatment of vaginal infections on shedding of Human Immunodeficiency Virus Type 1, JID 2001; 183;1017-22
4. Sha et al., Female genital tract HIV load correlates inversely with *Lactobacillus* species but positively with bacterial vaginosis and M*ycoplasm hominis*
5. Cohen MS. *Lancet* 1998; 351(suppl III):5-7.

Bibliography: Disparities, demographics and vaginal PH and flora

1. Royce et al., Race/Ethnicity Vaginal Flora Patterns, and pH during pregnancy, *Sexually transmitted Diseases*, Jan 1999-Vol. 26-Issue 2-pp96-102
2. Fiscella and Klebanoff, Are racial differences in vaginal pH explained by vaginal flora? *American Journal of Obstetrics and Gynecology*, 2004, 191;3 747-750
3. Ness et al., Can known risk factors explain racial differences in the occurrence of bacterial vaginosis?, Journal of the *National Medical Association* Vol 95. No. 3, March 2003

Bibliography: Bacterial Vaginosis

1. Carey et al., Metronidazole to prevent preterm delivery in pregnant women with asymptomatic bacterial vaginosis, *NEJM*, Feb 24, 2000, Vol 342, No. 8
2. Fethers et al, Early sexual experiences and risk factors for bacterial vaginosis, *JID* 2009:200
3. Schwebke, J. et al, Predictors of Bacterial Vaginosis in Adolescent Women who douche, *Sexually Transmitted Diseases*, July 2004, Vol. 31, No. 7, p433-438

Bibliography: Trichomonas Vaginalis

- Miller et al., Factors associated with prevalence and incidence of Trichomonas vaginalis infection among African American Women in New York City Who Use Drugs, JID 2008;197:503-9

Bibliography: Candidal Vulvovaginitis

- Barousse, M et al., Vaginal yeast colonisation, prevalence of vaginitis, and associated local immunity in adolescents, Sexually Transmitted Infections, 2004:80:48-53