

Vaginitis

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Objectives

1. Outline the pathophysiology of common causes of vaginitis
2. Differentiate causes of vaginitis based upon history, physical examination, and diagnostic testing
3. Discuss risk reduction and treatment options for causes of vaginitis

Teaching Instructions

Plan to spend at least 30-60 minutes preparing for this talk by reaching through the teaching instructions and clicking through the Interactive Board. All clickable elements are denoted with a shaded, rounded rectangle and/or a mouse icon.

Anticipated time to deliver the talk without cases or other features: 20 minutes; anticipated time with cases: 45 minutes. This talk can be presented in two ways:

1. Project the “Interactive Board for Presentation”
or
2. Reproduce a drawing of the presentation on a whiteboard.

With either method, print out copies of the Learner’s Handout so they may follow along during the presentation and take notes as you expand on the decision tree and apply it through the practice cases. Begin with reviewing the objectives for the session.

Teaching Script

Objective 1: Outline the pathophysiology of common causes of vaginitis (Overview and Causes)

Overview:

Review symptoms, general causes, and differential diagnosis for patients with vaginitis. Click on each of the corresponding buttons to reveal additional information.

- **Symptoms:** Vaginitis typically presents with symptoms of vulvar and/or vaginal itching and burning, as well as abnormal discharge and odor. Vaginitis can be divided into categories of infectious and non-infectious etiologies. While this talk focuses on infectious etiologies, potential non-infectious etiologies are important to exclude, particularly if patients are experiencing recurrent symptoms.
- **Causes:** *Ask learners to name common causes of infectious and non-infectious vaginitis and click each button to reveal examples.*
 - o **Infectious:** The most common infectious etiologies of vaginitis are bacterial vaginosis (BV), candida (yeast) vulvovaginitis, and trichomonal vaginitis.
 - o **Non-infectious:** Non-infectious etiologies can include atrophic vaginitis or genitourinary syndrome of menopause (GSM), irritant vaginitis, allergic vaginitis, and inflammatory vaginitis. Important mimics of vaginitis are sexually transmitted infections, most commonly due to chlamydia and/or gonorrhea.

Causes:

Normal vaginal flora is composed of 70-90% *Lactobacillus*, which help regulate vaginal pH and inhibit growth from other bacteria. Lactobacilli produce lactic acid, leading to a normal vaginal pH of 3.8 to 4.5. Hormonal fluctuations can dictate vaginal flora and pH as estrogen promotes lactobacilli concentrations.

Ask learners to outline how each cause of vaginitis (BV, Yeast, Trich, GSM) effect vaginal flora and expected pH and click each button to reveal explanations of pathophysiology for each cause.

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- **BV:** BV is the most common cause of vaginitis (15-50% of cases). BV is caused by a shift in vaginal flora leading to overgrowth of anaerobes that are normally found in the vagina (*Gardnerella vaginalis* and *mycoplasma hominis*) and decreased lactobacillus. The decrease in lactobacillus causes a decrease in lactic acid production, with an increase in vaginal pH > 4.5.
- **Yeast:** Yeast is another common cause of vaginitis, and 75% of females will have at least 1 episode in their lifetime. *Candida vulvovaginitis* is due to an overgrowth of *Candida albicans* (80-92% of cases), *krusei*, or *glabrata*. Yeast and lactobacilli can coexist, so there is no shift in vaginal pH.
- **Trich:** Trichomonal vaginitis is a highly infectious sexually transmitted infection found in 5 to 50% of cases of acute vaginitis. It is caused by the motile protozoan *Trichomonas vaginalis*, which leads to a decrease in lactobacillus and subsequent increased vaginal pH > 4.5. The mechanism for the increase in lactobacilli with trichomonas vaginitis is not well understood and may be due to phagocytosis or secretion of destructive proteinases by trichomonads.
- **GSM:** Decreased levels of estrogen seen in menopause lead to decreased lactobacillus, and a shift to a more alkaline vaginal pH > 5.0-5.5. The higher pH can promote overgrowth of bacteria, which can lead to infection and inflammation.

Objective 2: Differentiate causes of vaginitis based upon history, physical examination, and diagnostic testing (Evaluation)

The type of vaginitis cannot be determined by a patient's reported symptoms alone. All patients experiencing vaginitis should be offered an exam and diagnostic testing to determine the etiology of symptoms, and to differentiate infectious and non-infectious causes.

H&P:

For each cause of vaginitis (BV, Yeast, Trich) ask learners what questions they would ask patients during history taking (symptoms, risk factors) and what they would look for on exam. Click the button for each etiology to reveal the risk factors, vaginal discharge, and other signs and symptoms.

- **BV:** Risk factors for BV include having new or multiple sexual partners, same-sex partners, douching, and smoking. Vaginal discharge is typically thin, homogeneous and clear, white, or gray in appearance. Inflammation of the vagina/vulva is not typically present. Patients may report a "fishy" odor, which can also be noted during exam.
- **Yeast:** Risk factors for yeast vulvovaginitis include antibiotic use, diabetes, luteal phase of the menstrual cycle, and immunosuppression. Vaginal discharge is typically thick, "curd-like", white, and without odor. On exam, signs of inflammation including erythematous labia and vulva can be noted.
- **Trich:** Risk factors for trichomonas vaginitis include new partners, multiple partners, smoking, lack of barrier protection, and other sexually transmitted infections. Vaginal discharge is typically copious, frothy, and green-yellow. On exam, vulvar erythema and edema can be noted.

Bonus: GSM - With the decrease in estrogen, menopause increases a patient's risk for vaginal and vulvar irritation. Excess discharge is not usually reported or present, with reduced vaginal secretions more common. Vaginal atrophy, including thinning and decreased elasticity of vaginal tissue, may be seen on exam.

Bonus: Other risk factors - Vaginal flora can also be disrupted by sexual devices, topical products, and douching which can increase a patient's risk for vaginitis. It is important to include questions about these risk factors during history taking for patients with vaginitis, particularly those with recurrent symptoms.

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| | BV | Candida | Trichomonas | Noninfectious causes |
|-----------------------------|--|---|--|--|
| Risk factors | <ul style="list-style-type: none"> - New or multiple sex partners - Same sex partners - Douching - Smoking | <ul style="list-style-type: none"> - Antibiotic use - Diabetes - Luteal phase (menstrual cycle) - Immunosuppression | <ul style="list-style-type: none"> - New or multiple sex partners - Smoking - No barrier protection - Other STIs | <ul style="list-style-type: none"> - GSM: menopause, lactation - Irritant: sexual devices, topical agents, douching - Allergic: history of autoimmunity |
| Vaginal discharge | Thin, homogenous Clear, white or gray | Thick, "curd-like" White, non-odorous | Copious, frothy, green-yellow | Varied with cause |
| Other signs/symptoms | No inflammation ± fishy odor | Erythematous labia and vulva Excoriations Burning, itching | Vulva erythema and edema | Varied with cause |

Labs:

For each cause of vaginitis (BV, Yeast, Trich) ask learners what they would expect to see with diagnostic testing. Click the button for each etiology to reveal the expected pH, whiff test, wet prep findings, and other diagnostic tests.

Bonus: Whiff test - Diagnostic testing for vaginitis should include point of care pH testing and microscopy with a potassium hydroxide (KOH) and wet prep when possible. With the KOH prep, a drop or two of 10% KOH is added to a swab of the vaginal discharge on the slide. A "fishy" smell noted during this preparation would be a positive whiff test. The KOH disrupts membranes of the epithelial cells, allowing for yeast to be more easily seen under microscopy. For the wet prep, a drop or two of 0.9% saline is added to a swab of the vaginal discharge on a slide. The wet prep is best for viewing clue cells and trichomonads when present. Additional diagnostic testing is also widely available in the form of DNA assays for BV, yeast, and trich as both separate and combined assays from one swab. These assays are generally the most sensitive and specific form of testing for vaginitis. Vaginal discharge can also be sent for culture to detect yeast and for gram stain to detect BV when DNA assays are not available. Nugent criteria is used to diagnose BV from gram stain based upon the ratio of *Lactobacillus*, *Gardnerella* and *Bacteroides*, and curved gram-variable rods.

- **BV:** A pH of >4.5 is highly sensitive for BV, and a positive whiff test is specific for this diagnosis. On wet prep, clue cells (vaginal epithelial cells with adherent coccobacilli and "shaggy" borders) can be visible. The Amsel criteria for BV includes three of the following: (1) homogeneous, thin, grayish white discharge that smoothly coats the vaginal walls, (2) vaginal pH > 4.5, (3) positive whiff test, and (4) clue cells on saline wet mount (at least 20% of epithelial cells). Amsel criteria is highly sensitive but not as specific as a gram stain or DNA assay for the detection of BV.
- **Yeast:** Vaginal pH is normal in the setting of yeast vulvovaginitis with a negative Whiff test. Hyphae and budding seen on KOH prep are specific for this diagnosis, but not highly sensitive. Culture is moderately sensitive for the detection of yeast. DNA assays are both highly sensitive and specific.
- **Trich:** pH is generally elevated with Trich, although this is less sensitive and specific than an elevated pH for BV. A whiff test may be positive. Motile trichomonads and an increase in white blood cells can be seen on wet prep, which is specific but not sensitive for this diagnosis. DNA testing or NAAT is the most specific and sensitive way to diagnose trichomonas.

Bonus: GSM - pH is generally elevated. Whiff test should be negative. Wet prep and additional diagnostic testing can be sent if abnormal discharge is present, but usually discharge is decreased with GSM.

Bonus: Co-existing etiologies - Of note, different types of vaginitis can co-exist. For example, a patient with both yeast and BV may have an elevated pH, and presence of both clue cells and hyphae on microscopy. A shift in vaginal flora

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suggestive of BV, hyphae/budding, or trichomonads can also be noted incidentally on reports from pap smears. In this situation, patients can be treated if symptomatic and monitored if asymptomatic.

| | BV | | | Candida | | | Trichomonas | | |
|-----------------|-----------------|-----------------|-----------------|---------------------------------|-------------------|-----------------|-----------------------------|-----------------|-----------------|
| | | Sn | Sp | | Sn | Sp | | Sn | Sp |
| pH | pH > 4.5 | 97 ² | 64 ² | 4.0-4.5 (normal) | | | >4.5 (often >5) | 56 ² | 50 ² |
| Whiff | Positive | 43 ³ | 91 ³ | Negative | | | ±Positive | | |
| Wet prep | Clue cells | 80 ³ | 80 ³ | Hyphae/budding yeast (KOH prep) | ~60 ¹ | 97 ² | Motile trichomonads ↑WBC | 55 ¹ | 95 ² |
| Dx tests | Gram stain | 70 ¹ | 94 ¹ | Culture | 85 ² | | Rapid Ag testing | 88 ¹ | 99 ¹ |
| | DNA assay VPIII | 90 ¹ | 96 ¹ | DNA assay VPIII | ~80s ¹ | 97 ¹ | DNA assay VPIII | 93 ¹ | 99 ¹ |
| | Amsel criteria | 92 ¹ | 77 ¹ | Pap smear | 25 ² | 72 ² | Pap smear | 92 ² | 61 ² |
| | | | | PCR | 90 ¹ | 94 ¹ | NAAT PCR | 99 ² | 99 ² |

¹Marnach ML, et al. Evaluation and Management of Vaginitis. *Mayo Clin Proc.* 2022; 97(2):347-358.

²Eckert LO & Lentz GM. Genital tract infections: Vulva, Vagina, Cervix, Toxic Shock Syndrome, Endometritis, and Salpingitis. *Comprehensive Gynecology*. Eighth Edition. 2022. Elsevier. Philadelphia, PA. Pages 515-542.

³Laine C, Williams S. Vaginitis and cervicitis. *Annals of Int Med.* 2009; 151 (5)

Objective 3: Discuss risk reduction and treatment options for causes of vaginitis (Management)

For each cause of vaginitis (BV, Yeast, Trich) ask learners what treatment and risk reduction options they would discuss with patients. Click the button for each etiology to reveal the topical treatment options, oral treatment options, and preventative recommendations.

Both topical and oral treatment options are equally effective when used as directed, and treatment route should be based upon patient preferences, medication allergies, and pregnancy status.

- **BV:** Treatment for BV can be topical or oral metronidazole or clindamycin. Preferred treatment during pregnancy is either topical option or oral metronidazole. The risk of BV can be decreased with fewer sexual partners, avoiding douching, properly cleaning sexual devices, and smoking cessation.
- **Yeast:** Yeast can be treated with topical miconazole or clotrimazole or with oral fluconazole. Topical treatments are recommended during pregnancy. The risk of yeast can be decreased with improved glycemic control when hyperglycemia is present and avoiding unnecessary antibiotics.
- **Trich:** Treatment for trichomonas is with oral metronidazole or tinidazole, with metronidazole preferred in pregnancy. Sexual partners should also be evaluated and treated for trichomonas, and sexual activity should be avoided until both partners have completed treatment. The risk of trichomonas can be reduced with fewer sexual partners, use of barrier protection, avoiding douching, and properly cleaning sexual devices.

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| Treatment | Bacterial vaginosis | Candidal vulvovaginitis | Trichomonal vaginitis |
|------------------|--|---|--|
| Topical | - Metronidazole 0.75% 5g intravaginal daily x 5 days - Clindamycin 2% cream intravaginally qHS x 7 days | - Miconazole 4% cream 5 g intravaginal daily x 3 days - Miconazole 2% cream 5gm intravaginal daily x 7 days - Miconazole vaginal suppository 1200mg x 1 day - Clotrimazole 2% cream 5 g intravaginal daily x 3 days - Clotrimazole 1% cream 5 g intravaginal daily x 7 days | None |
| Oral | - Metronidazole 500 mg PO BID x 7 days - Clindamycin 300 mg PO BID x 7 days | Fluconazole 150 mg PO x1 | - Tinidazole 2 g PO x1 - Metronidazole 500 mg PO BID x 7 days |
| Pregnancy | Same | Topical miconazole or clotrimazole x 7 days | Metronidazole 500 mg BID x 7 days |

Printout(s)

1. Learner's handout: A pdf of the skeleton of the framework you are teaching and the cases you will be using to reinforce it. There are also optional questions to test their knowledge based on the learning objectives.

Take Home Points

1. The pathophysiology of common causes of vaginitis (bacterial vaginosis, candida vulvovaginitis, and trichomonas vaginitis) lead to different levels of disruption of vaginal flora and consequent vaginal pH.
2. An exam with a wet prep and/or additional diagnostic testing should be completed in patients with symptoms of vaginitis to determine the underlying etiology.
3. Treatment of vaginitis should be targeted to the underlying etiology determined through exam and diagnostic evaluation, with a discussion of risk reduction strategies particularly for patients with recurrent symptoms.

References:

1. Workowski KA, et al. Sexually Transmitted Infections Treatment Guidelines, 2021. *MMWR Recomm Rep*. 2021 Jul 23;70(4):1-187. doi: 10.15585/mmwr.rr7004a1. PMID: 34292926; PMCID: PMC8344968. <https://www.cdc.gov/std/treatment-guidelines/vaginal-discharge.htm>
2. Vaginitis in Nonpregnant Patients: ACOG Practice Bulletin Summary, Number 215. *Obstet Gynecol*. 2020 Jan;135(1):243-245. doi: 10.1097/AOG.0000000000003605. PMID: 31856118..
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