Chapter 13

ANALYSIS OF VAGINAL SECRETIONS

Vaginal Secretions

Most common gynecologic complaints are vaginal discharge, vaginal discomfort, and vaginal odor

Three major causes of above symptoms:

- Bacterial vaginosis
- Candidiasis
- Trichomoniasis

Clinical presentations of these three causes are similar, but treatments are different; so need to differentiate

Tests to Differentiate

Causes differentiated by direct microscopy tests:

- Wet mount examination
- Amine of “whiff” test
- Potassium hydroxide (KOH) examination
- Gram stain

Must use appropriate collection techniques: Dacron swab on a plastic shaft or a sterile wire loop to obtain vaginal secretions

pH of Vaginal Secretions

Determined using commercial pH paper before other testing

Usual pH range 3.8 to 4.5

Healthy vaginal bacteria are lactobacilli, which produce lactic acid and hydrogen peroxide and maintain normal acidic pH

Hydrogen peroxide is bactericidal and prevents overgrowth of some microbes such as *Gardnerella vaginalis*

Absence of lactobacilli associated with bacterial vaginosis

Wet Mount

Performed immediately to ensure detection of motile *Trichomonas vaginalis*

Vaginal swab placed in sterile physiologic saline to release secretions from swab

Coverslip placed on a drop of saline-suspended specimen

Examined on low and high power using bright-field or phase-contrast microscope

Elements Reported in Wet Mounts

Red blood cells

White blood cells

Predominant bacterial morphotypes

Yeast, hyphae/pseudohyphae

Trichomonads

Clue cells

Parabasal cells

Basal cells

Squamous epithelial cells

Blood Cells

White blood cells (WBCs) are present in vaginal secretions in health, with higher levels during ovulation and menses

Red blood cells (RBCs) not usually present, unless during menses

Important to have current patient history to accompany specimen

Normal Vaginal Bacterial Flora

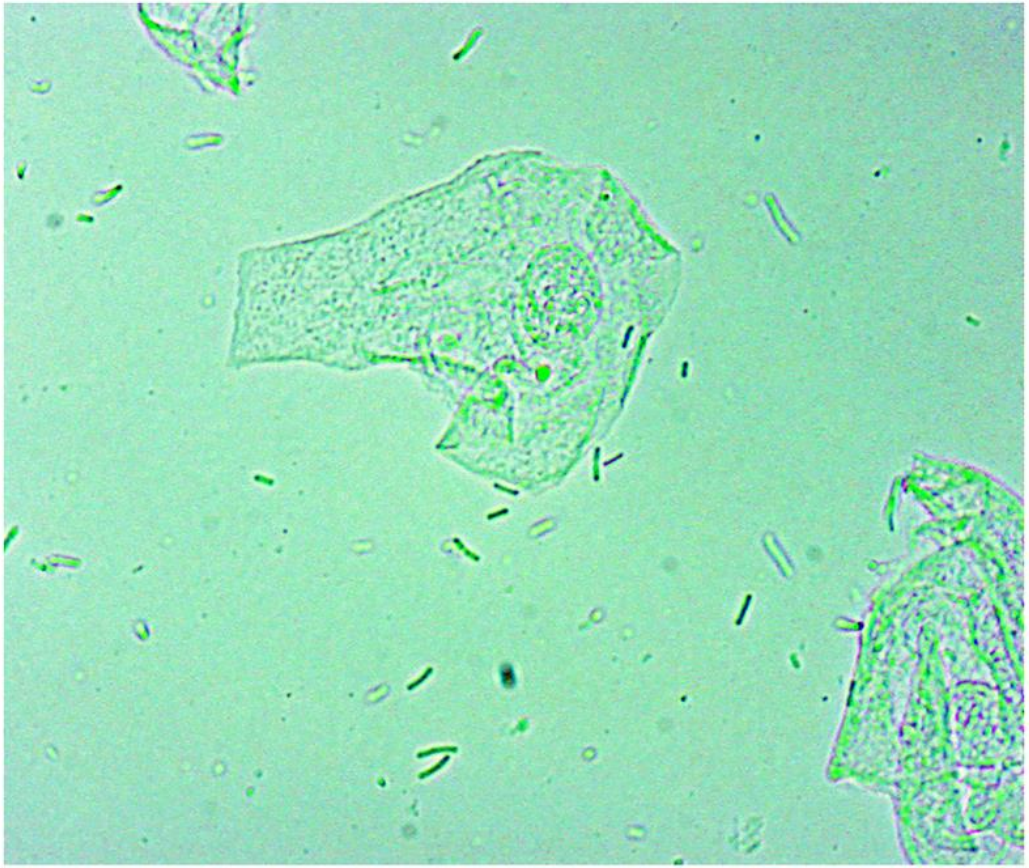
Normal vaginal bacterial flora complex

Large rods of lactobacilli account for 50% to 90% of microbes of healthy vagina

Any decrease of lactobacilli relative to amount of squamous epithelials is an indication of an imbalance in microbial flora

Increased numbers of preponderance of other bacterial morphotypes are abnormal

Figure 13-1. Large rods characteristic of *Lactobacillus* spp. surrounding a typical squamous epithelial cell from a healthy vagina.



Epithelial Cells

Vagina is lined with stratified squamous epithelium

Often present on swabs of vaginal mucosa

Predominant cell type in wet mounts of healthy vagina

Easily identified by large (30 to 60 mm), thin, flat, and flagstone-shaped appearance

Have small, centrally located nucleus and large amount of cytoplasm that becomes finely granulated as cell ages

Clue Cells

Formed when numerous bacteria adhere to membranes of epithelial cells

Need to be distinguished from aging squamous epithelials that are normally seen

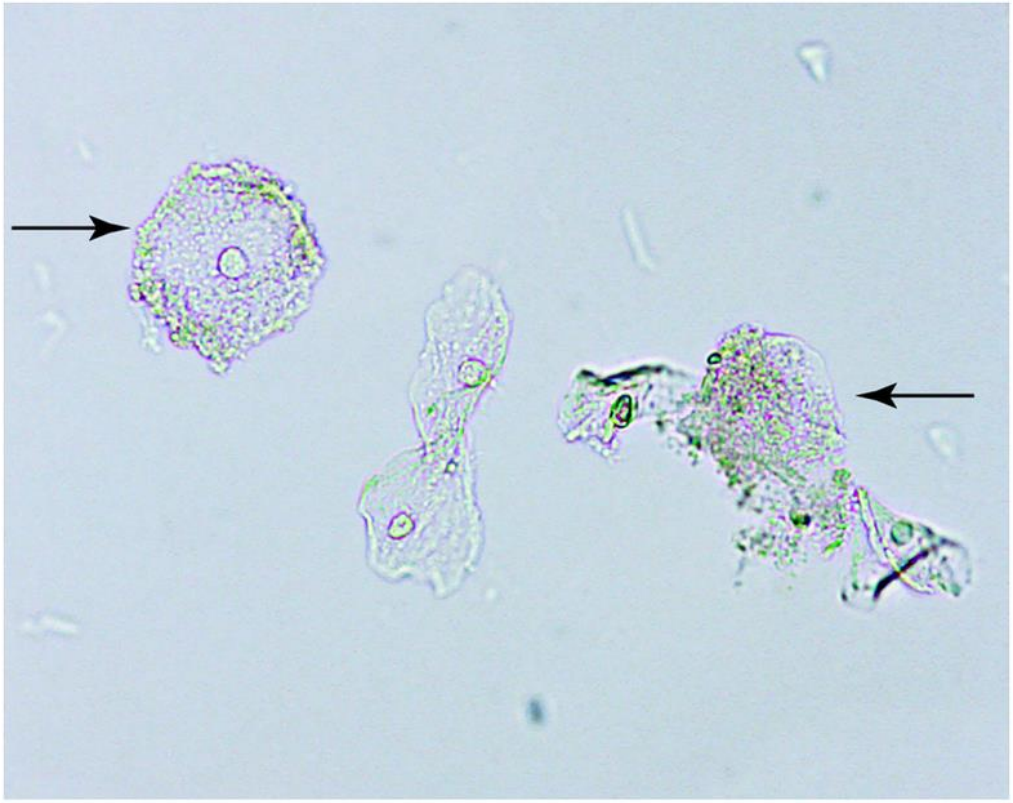
A diagnostic indicator of bacterial vaginosis

Have shaggy-appearing edges; nuclei may not be visible

Bacteria should cover at least 75% of the cell surface

Bacterial organisms must extend beyond the cell's cytoplasmic borders

Figure 13-4. Two clue cells *(arrows)* and several normal squamous epithelial cells in the wet mount of a vaginal secretion specimen.



Parabasal Cells

15 to 40 µm

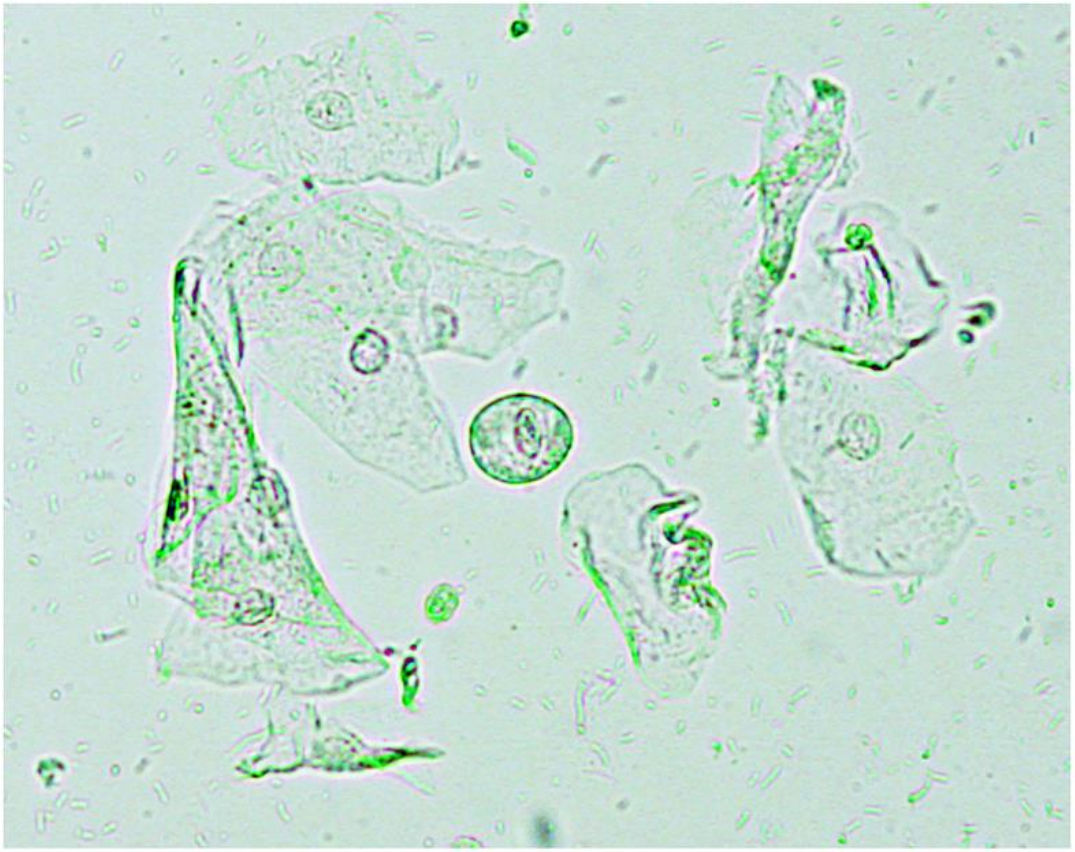
None or very few present in normal vaginal samples

Increased numbers in menses or postmenopausal period

Increased numbers seen in atrophic vaginitis and desquamative inflammatory vaginitis

Oval to round with small nucleus to cytoplasm ratio (1:1 or 1:2)

Figure 13-5. A single parabasal cell surrounded by numerous squamous epithelial cells.



Basal Cells

10 to 16 µm, similar in size to WBCs

Presence in wet mount is abnormal

Nucleus/cytoplasm ratio is 1:2

Accompanied usually by numerous WBCs

Seen in desquamative inflammatory vaginitis

Trichomonads

Flagellated protozoans that infect and cause inflammation of vaginal epithelium

Pear- or turnip-shaped unicellular bodies

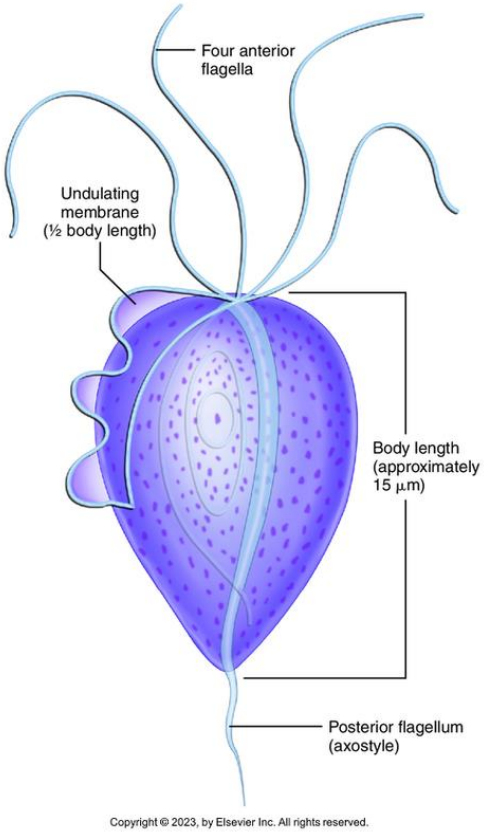
Average 15 mm long; can vary from 5 to 30 mm

Optimal growth at pH 6.0; identified by jerky movement due to four anterior flagella and an undulating membrane

Nonmotile or dead resemble WBCs

Stains are toxic to trichomonads

Figure 13-6. Schematic diagram of *T. vaginalis*.



Potassium Hydroxide (KOH) and Whiff Test

One drop of 10% KOH and one drop of vaginal suspension

Immediately observed for release of “fishy” odor

Odor is trimethylamine—released from polyamines when pH changes due to KOH

In bacterial vaginosis, altered flora produce polyamines

KOH digests cellular elements in order to visualize fungal elements

Bacterial Vaginosis

Lactobacilli replaced by overgrowth of *Gardnerella vaginalis* and a facultative anaerobe

Often asymptomatic except for foul discharge

Presence of clue cells, absence of lactobacilli

Positive amine whiff test

Vaginal pH usually greater than 4.5

Candidiasis

Second most common cause of vaginitis

Candida albicans responsible for majority of cases

Part of normal flora, but overgrowth occurs with changes in pH or normal flora

Symptoms of vulvovaginal itching, soreness, external dysuria, and a white, curdlike discharge

Candidiasis (Cont.)

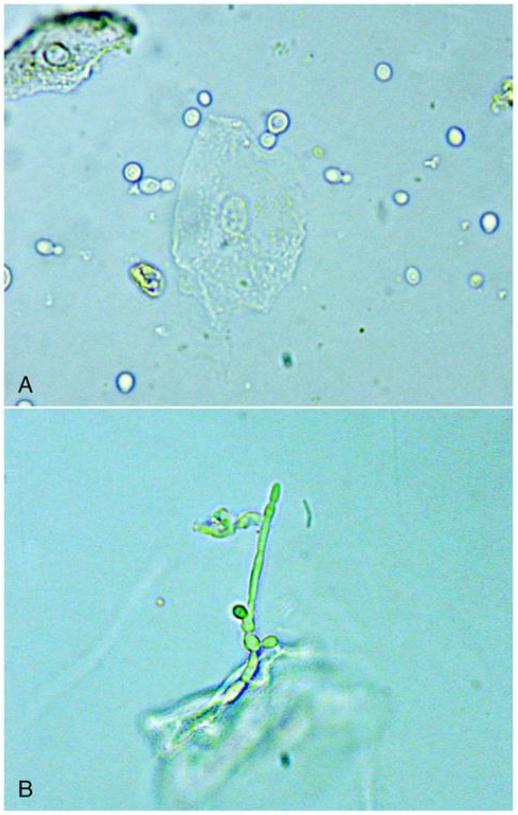
Wet mount and KOH reveals budding yeast and/or pseudohyphae and increased WBCs

pH is normal and amine test negative

Often caused by use of broad-spectrum antibiotics or oral contraceptives

Diabetes, human immunodeficiency virus (HIV), or immunosuppression predisposes one to *Candida*

Figure 13-2. Yeast and pseudohyphae in the wet mount of a vaginal secretion specimen. **A**, Budding yeast (blastoconidia) and two squamous epithelial cells. **B**, Pseudohyphae.



Trichomoniasis

Most common parasitic gynecologic infection

Sexually transmitted usually

Recurrence is common after treatment; need to treat partners also

Transmission of HIV facilitated in women with trichomoniasis

In pregnant women, it is a risk factor for premature labor or rupture of membranes

Trichomoniasis (Cont.)

50% of women are asymptomatic; others have frothy, bad-smelling yellow to green discharge

Soreness of vulva, external dysuria, dyspareunia

Punctate hemorrhages on exocervix

pH elevated (5 to 6)

Numerous WBCs; often whiff test is positive

If wet mount is negative, a culture of deoxyribonucleic acid (DNA) probe can be used to diagnose

Figure 13-7. Two trichomonads. Visible on the upper organism are three of the four anterior flagella *(upper arrow)*, a portion of the undulating membrane *(lower arrow)*, and the posterior axostyle.

Atrophic Vaginitis

Occurs in peri- and postmenopausal women

Thinning of vaginal epithelium and decrease in glycogen production resulting in dryness, soreness, and spotting

Results in decrease in lactobacilli and overgrowth of other bacteria

pH greater than 5

Treatment involves replacement of estrogen