Chlaymdia and Gardenella

Urogenital Tract Module

Microbiology lecture 4

Dr. Hala Altarawneh

Introduction

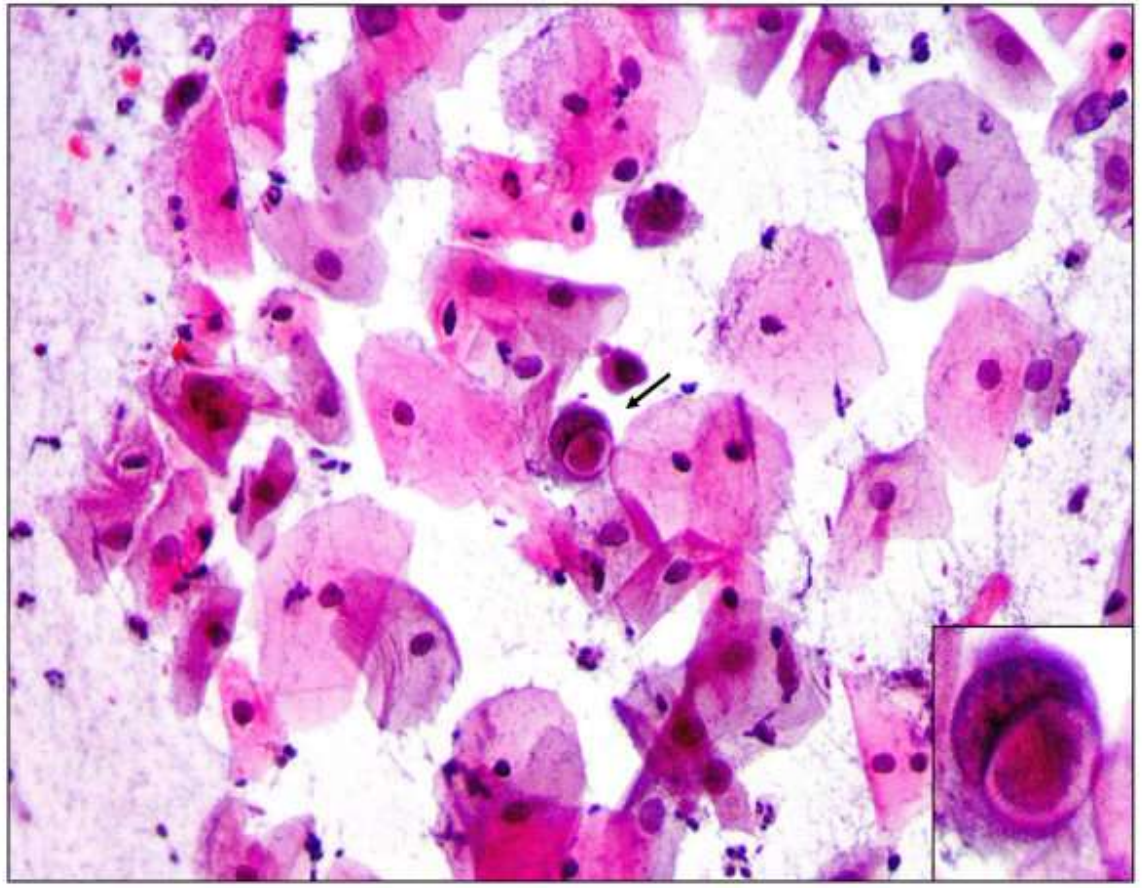
- Chlamydiaceae is a family of gram-negative coccobacilli, obligate intracellular bacteria that includes 3 organisms pathogenic to humans:
  - Chlamydia trachomatis
  - Chlamydophila pneumoniae
  - Chlamydophila psittaci

General characteristics of chlamydia

- Gram-negative coccobacilli that Gram stain poorly
- Obligate intracellular bacteria (unable to produce its own ATP)
- Absent peptidoglycan in the cell wall, which makes beta-lactam antibiotics ineffective.
- Visible as cytoplasmic inclusion bodies on Giemsa stain or fluorescent antibody-stained smear
- Very difficult cultivation

Microscopic features of Chlamydia

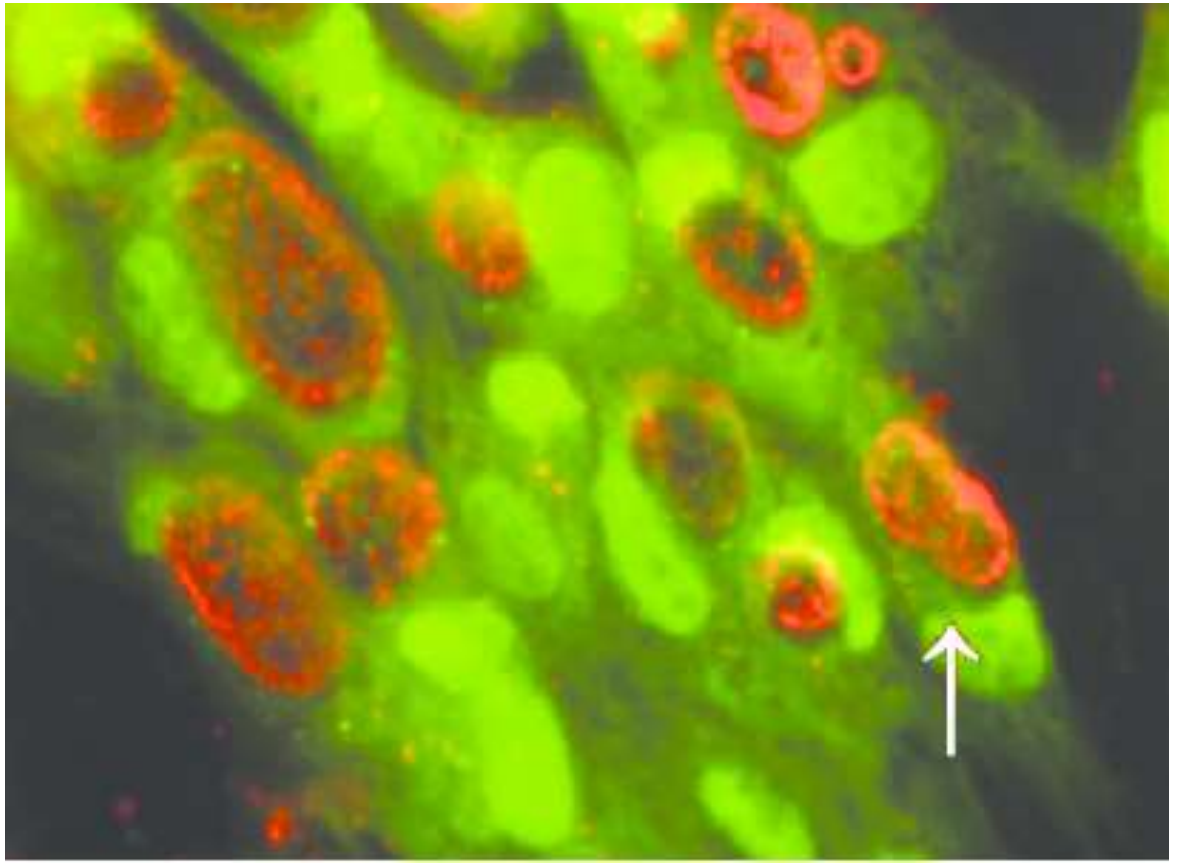
- **Giemsa Staining** photograph showing a squamous cell with cytopathic changes characterized by the presence of a cytoplasmic inclusion body (arrow and inset) indicating Chlamydia infection.



Microscopic features of Chlamydia

- Direct fluorescent antibody – C. trachomatis using Chlamydia monoclonal antibody conjugate. Red spots representing EBs.

The arrow points to an inclusion body.



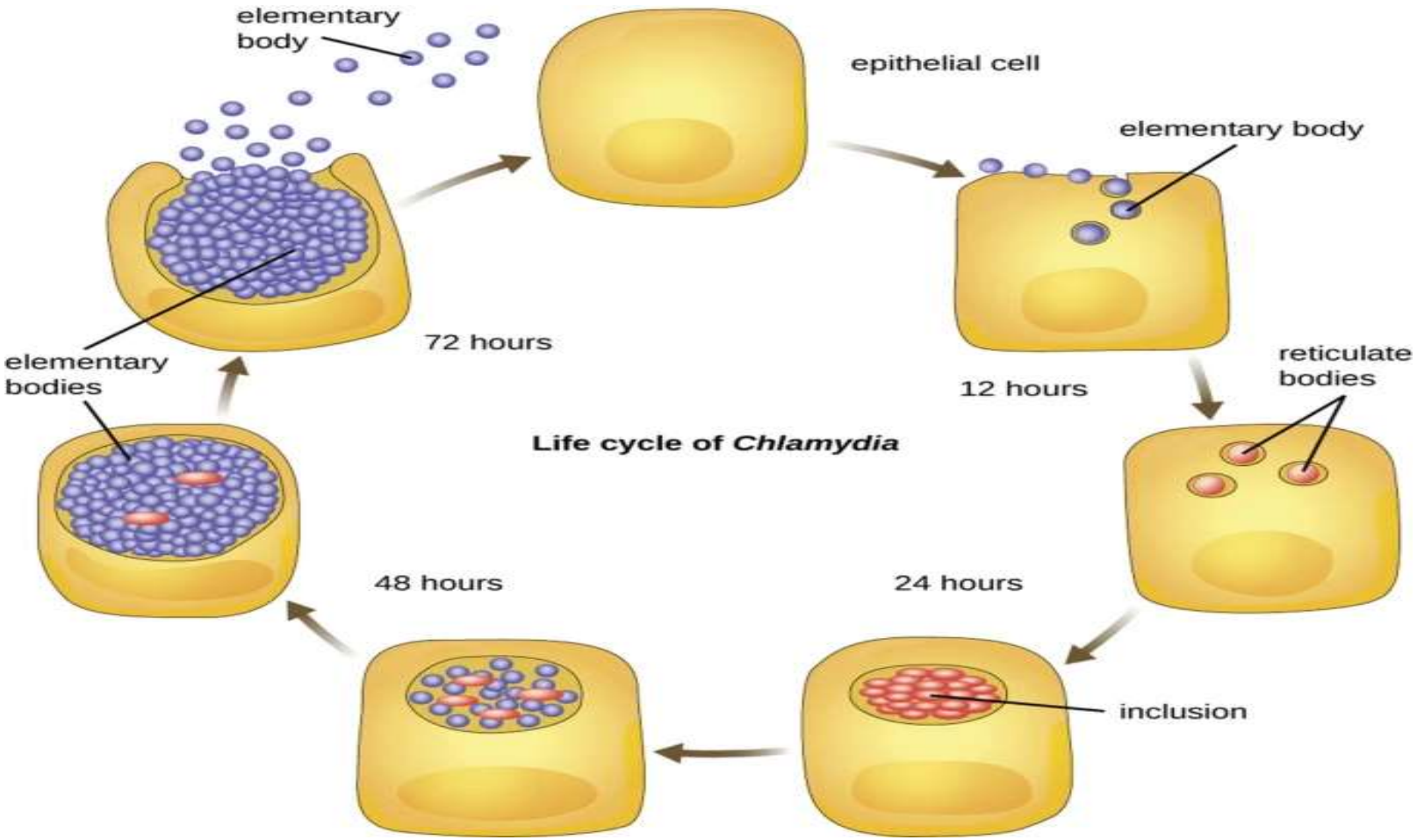
Characteristics of Chlamydiaceae

Bacteria	Serotype	Target	Transmission	Disease
C. trachomatis	A–C	Eyes	Contact with discharge from the eyes or nose of infected persons	Trachoma
	D–K	• Eyes • Genitourinary tract • Lungs	Sexual activity Vaginal birth (in which the mother is infected)	• Chlamydial genitourinary infections • Proctitis • Neonatal chlamydial conjunctivitis • Infant pneumonia • Reactive arthritis
	L1–L3	•Urinary tract •Anorectal area •Genitourinary tract	Sexual activity	Lymphogranuloma venereum (LGV)

Characteristics of Chlamydiaceae

Bacteria	Serotype	Target	Transmission	Disease
C. pneumoniae	-	Lungs	Person-to-person transmission of respiratory secretions via aerosols	Atypical pneumonia
C. psittaci	-	Lungs	Airborne transmission	Atypical pneumonia

Chlamydia life cycle



Genitourinary chlamydia (Nonlymphogranuloma venereum)

- **Etiology:** Chlamydia trachomatis serotypes D–K

- **Transmission:** May be transmitted through genital-to-genital contact.
- **Epidemiology:** One of the most common STIs in the US. One of the most common causes of pelvic inflammatory disease

Genitourinary chlamydia clinical presentation

- The majority of infected individuals are **asymptomatic.**
- Patients may present with urethritis (can cause dysuria or polyuria) or proctitis
- Female patients may additionally present with salpingitis, cervicitis, or symptoms of pelvic inflammatory disease:
  - (Muco)purulent vaginal discharge
  - Abnormal uterine bleeding
  - Postcoital bleeding or dyspareunia
- Male patients may additionally present with epididymitis or prostatitis.
- Symptoms of reactive arthritis may also be present.

Genitourinary chlamydia diagnosis

Preferred test: Nucleic Acid Amplification Test (NAAT). It detects Chlamydia trachomatis RNA or DNA, e.g., by PCR.

Specimen collection:

In females: vaginal swab (preferred), cervical swab, or first-void urine.

In males: first-void urine (preferred) or urethral swab.

Genitourinary chlamydia Treatment

- Start antibiotic therapy (even if asymptomatic), e.g., doxycycline or azithromycin.
- Evaluate and treat partners.
- Test for common sexually transmitted coinfections. All patients: HIV testing, gonorrhea testing, syphilis testing
- Report all cases of genitourinary chlamydia to the local health department.

Genitourinary chlamydia complications

- Pelvic inflammatory disease Ectopic pregnancy
- Infertility
- Reactive arthritis
- Perinatal transmission causing: Neonatal chlamydial conjunctivitis, infant pneumonia due to Chlamydia trachomatis.

Lymphogranuloma venereum

- **Etiology:** Caused by Chlamydia trachomatis serotypes L1–L3

- **Epidemiology:** Globally: more common in tropical and subtropical regions.

Lymphogranuloma venereum clinical presentation

- Rectal infection (most common): proctitis or proctocolitis
  - ~ 50% of cases may be asymptomatic or mild.
  - Mild symptoms: constipation, mucous streaking of stool.
  - Severe symptoms: rectal pain, bleeding, and discharge; tenesmus, and systemic symptoms.
- Genital or anal infection: genital and inguinal disease:
  - Primary infection (after approx. 1 week): Small, painless genital ulcers that heal spontaneously within a few days. May be accompanied by mucopurulent discharge.
  - Secondary infection (2–6 weeks after onset of primary infection): Painful swelling of the lymph nodes in the inguinal region.

Lymphogranuloma venereum diagnosis

- Genotyping (e.g., by PCR) of sample taken for NAAT to identify the C. trachomatis serotypes associated with LGV.

- If clinical suspicion for LGV is high, start antibiotic treatment immediately rather than waiting for the results of diagnostic testing.

Lymphogranuloma venereum treatment

- Start antibiotic therapy (preferably doxycycline).
- Evaluate and treat the partner.
- Testing for common sexually transmitted coinfections is recommended: HIV testing, gonorrhoea testing, syphilis testing.
- Report all cases of LGV to the local health department.

Infant pneumonia due to Chlamydia trachomatis

- **Transmission:** perinatal transmission during delivery via contact with the genital flora of an infected mother.
- **Incubation period:** 4–12 weeks after delivery.
- **Clinical features:**
  - Staccato cough, tachypnoea, nasal congestion
  - Typically afebrile,
  - Accompanied by neonatal conjunctivitis in up to 50% of all cases

Infant pneumonia due to Chlamydia trachomatis

- **Diagnostics:**
  - Culture from the nasopharyngeal specimen
  - Nonculture tests, such as direct fluorescence antibody and nucleic acid amplification tests (NAATs), may be performed.
  - CBC may reveal eosinophilia.
- **Prevention:** maternal screening and treatment before birth
- **Treatment:** oral erythromycin, azithromycin

Infectious Vulvovaginitis (Gardnerella vaginalis)

Introduction

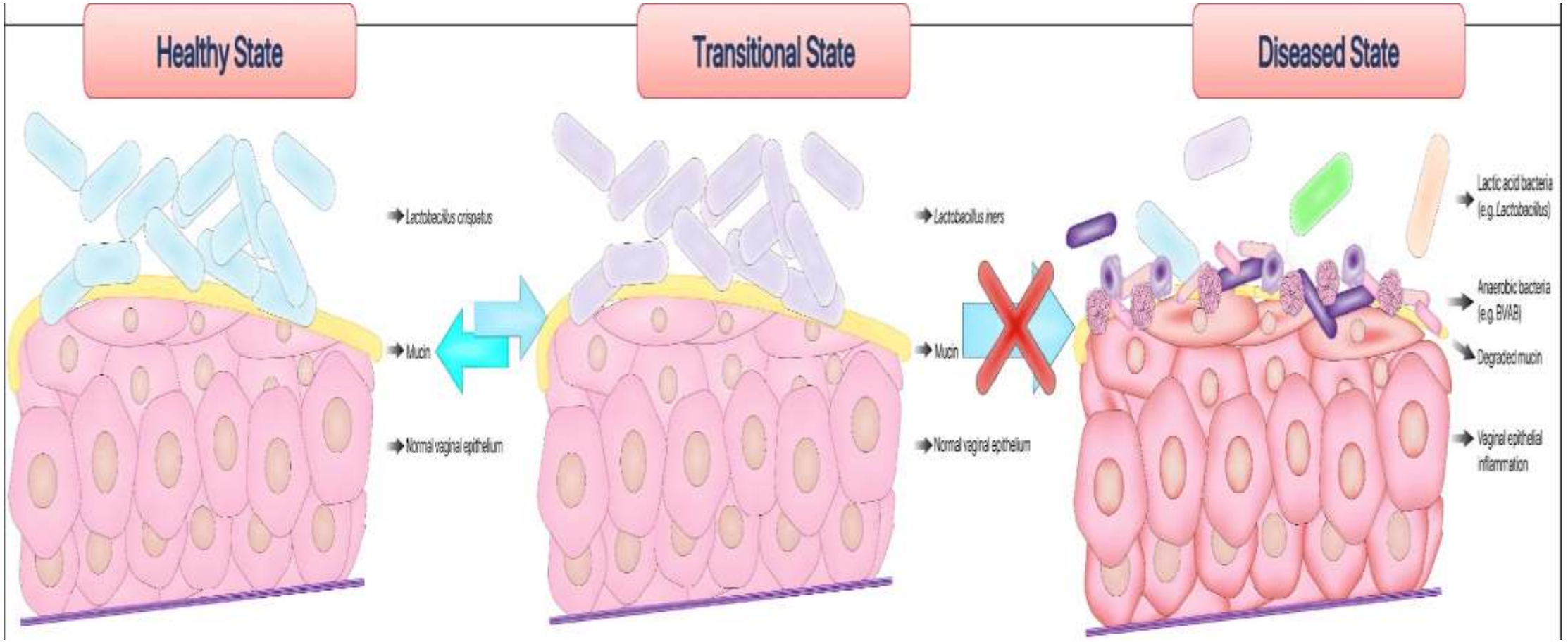
- Vulvovaginitis refers to a large variety of conditions that result in inflammation of the vulva and vagina.

- The causes may be infectious (e.g., bacterial vaginosis in most cases) or non-infectious such as allergic vulvovaginitis, and genitourinary syndrome of menopause.

Introduction

- Physiologically, the normal vaginal flora (mainly lactobacilli) keeps the pH levels of the vaginal fluids low, thus preventing the overgrowth of pathogenic and opportunistic organisms. Disruption of that flora (e.g., due to sexual intercourse) predisposes to infection and inflammation.

Introduction



Infectious vulvovaginitis: Bacterial vaginosis

- **Epidemiology:** most common vaginal infection in women (22–50% of all cases).
- **Pathogen:** Gardnerella vaginalis (a pleomorphic, gram-variable rod).

- **Pathophysiology:** lower concentrations of Lactobacillus acidophilus led to overgrowth of Gardnerella vaginalis and other anaerobes, **without vaginal epithelial inflammation due to absent immune response**

Infectious vulvovaginitis: Bacterial vaginosis

Risk factors:

- Sexual intercourse (primary risk factor, but it is not considered an STD)
- Intrauterine devices
- Vaginal douching
- Pregnancy

Clinical features:

- Commonly asymptomatic
- Increased vaginal discharge, usually gray or milky with fishy odor
- Pruritus and pain are uncommon.

Infectious vulvovaginitis: Bacterial vaginosis

Diagnostics: diagnosis is confirmed if three of the following Amsel criteria are met:

- Clue cells: Vaginal epithelial cells with a stippled appearance and fuzzy borders due to bacteria adhering to the cell surface.
- Vaginal pH > 4.5
- Positive amine test: The addition of 1–2 drops of potassium hydroxide to a sample of infected vaginal discharge emits a characteristic amine odor.
- Thin, homogeneous gray-white or yellow discharge.

Infectious vulvovaginitis: Bacterial vaginosis

Treatment:

Asymptomatic: reassurance; often resolves without treatment

Symptomatic: First-line in nonpregnant and pregnant patients: Oral metronidazole OR intravaginal metronidazole

Treatment of partner is not recommended.

Complications

Adverse pregnancy outcomes: Preterm delivery, spontaneous abortion, postpartum endometritis.