***Trichomonas*:**

Objectives:

The main objectives of this lecture are:

- *Trichomonas vaginalis* (Biology, transmission, pathogenesis, clinical picture, diagnosis, treatment and prevention).
- Other trichomonas as *Ttichomonas tenax and Trichomonas hominis*

Trichomonas vaginalis:

- Trichomoniasis is the most prevalent non-viral sexually transmitted infection affecting an estimated 3.7 million persons in USA.
- It is an anerobic, flagellated motile protozoan parasite.
- Alfred Francois Donné (1801-1878) was the first to describe a procedure to diagnose trichomoniasis through "the microscopic observation of motile protozoa in vaginal or cervical secretions in 1836.

Morphology:

- *Trichomonas vaginalis* exists in only one morphological stage, a trophozoite that cannot encyst.
- The *T. vaginalis* trophozoite is oval, flagellated, pear shaped as seen on a wet-mount.
- It is slightly larger than a white blood cell, measuring 9 × 7 μm.
- Five flagella arise near the cytostome; four of these immediately extend outside the cell together, while the fifth flagellum wraps backwards along the surface of the organism. In addition, a conspicuous barb-like axostyle projects opposite the four-flagella bundle.
- The axostyle may be used for attachment to surfaces and may also participate in the tissue damage seen in trichomoniasis. While *T. vaginalis* does not have a cyst form, organisms can survive for up to 24 hours in urine, semen, or even water samples.
- Trophozoites divide by *binary fission.*
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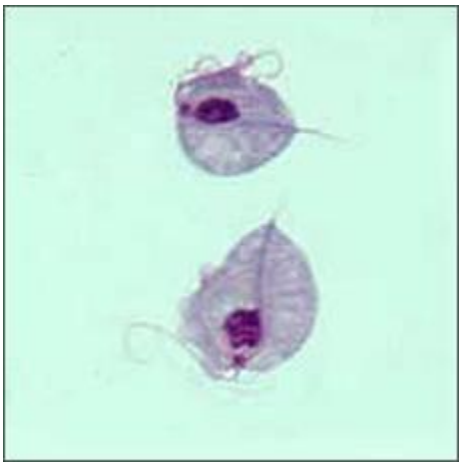
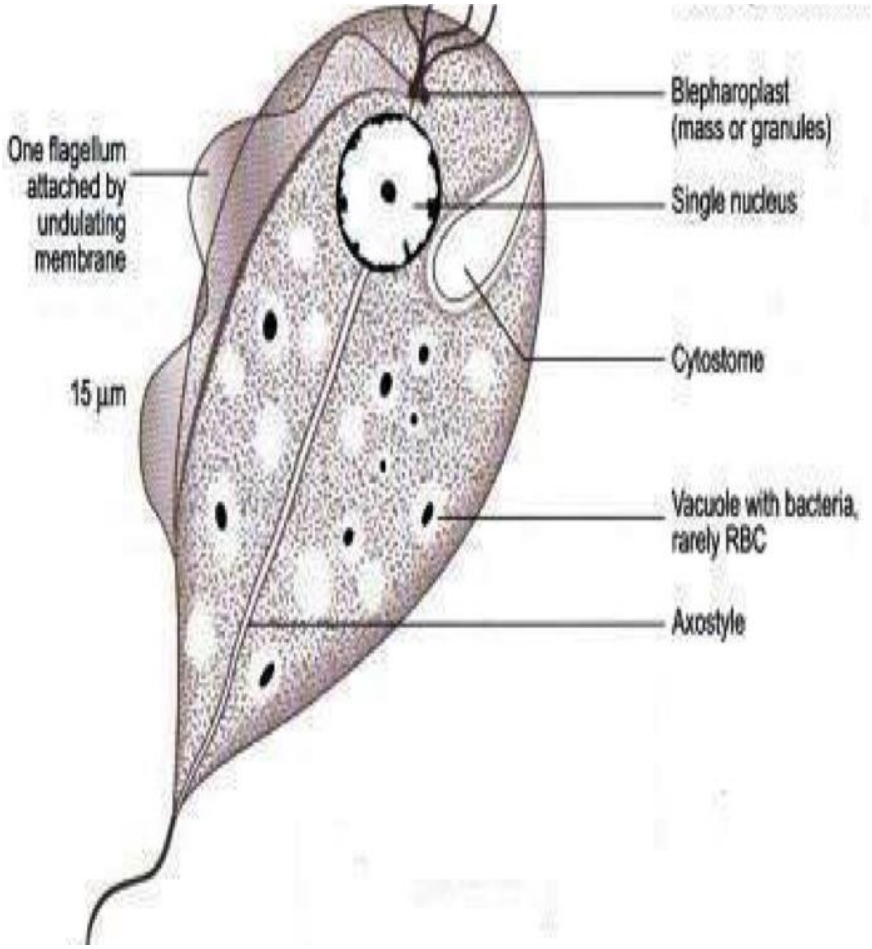


Trichomonas vaginalis trophozoite.(1).



Trophozoite of T. vaginalis (2).

Transmission

- The trophozoite cannot survive outside and so infection has to be transmitted directly from person-to-person.
- **Sexual transmission is the usual mode of infection.** Trichomoniasis often coexists with other sexually transmitted diseases like candidiasis, gonorrhea, syphilis, or human immunodeficiency virus (HIV).
- Babies may get infected during birth.
- Vaginal pH of > 4.5 facilitates infection.
- Fomites such as towels may transmit infection.

Habitat

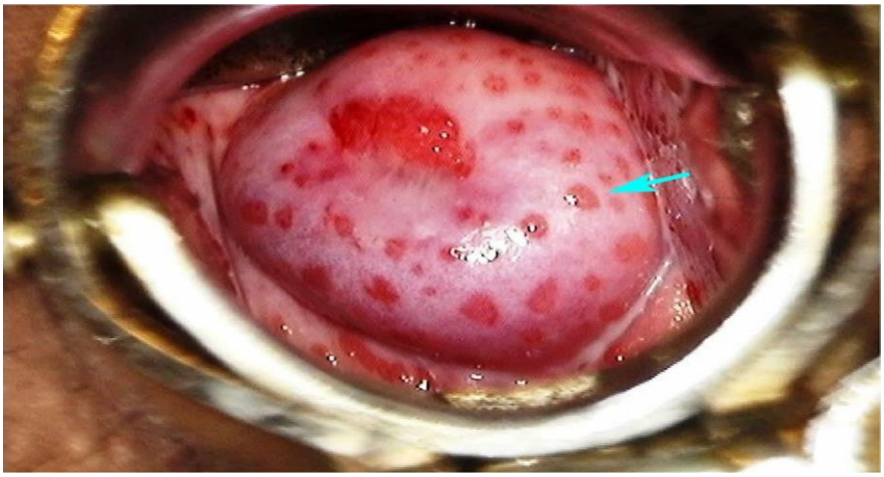
In females, it lives in vagina and cervix, and may also be found in Bartholin 's glands, urethra and urinary bladder. In males, it occurs mainly in the anterior urethra, but may also be found in the prostate and preputial sac.

Infective stage:

- The *trophozoite itself is the infective form.*

Pathogenesis

- *T. vaginalis particularly infects squamous epithelium but not* columnar epithelium.
- It is an ***obligate parasite and cannot live without close*** association with the vaginal, urethral, or prostatic tissues.
- It secretes cysteine proteases, adhesins, lactic acid and acetic acid, which disrupt the *glycogen* and lower the *pH of the vaginal fluid.*
- Parasite causes petechial hemorrhage and mucosal capillary dilation ***(strawberry mucosa), metaplastic*** changes and desquamation of the vaginal epithelium.
- Intracellular edema and so called *chicken-like epithelium,* which is the characteristic feature of trichomoniasis.



Strwberry mucosa(3).

Clinical picture:

- The incubation period of trichomoniasis is 4 days to 4 weeks.
- Infection is often asymptomatic, particularly in males, although some may develop urethritis, epididymitis and prostatitis.
- In females, it may produce severe pruritic vaginitis with an offensive, yellowish green, often frothy discharge, dysuria and dyspareunia.
- Cervical erosion is common.
- Endometritis and pyosalpingitis are infrequent complications.
- Rarely, neonatal pneumonia and conjunctivitis have been reported in infants born to infected mothers.
- *T. vaginalis* infection is associated with two to threefold increased risk for HIV transmission, preterm birth, and other adverse pregnancy outcomes among pregnant women.

- Among women with HIV infection, *T. vaginalis* infection is associated with increased risk for pelvic inflammatory diseases and developing cervical cancer.

Diagnosis

- Diagnostic testing for *T. vaginalis* should be performed in women seeking care for vaginal discharge.
- Screening might be considered for persons receiving care in high-prevalence settings (e.g., sexual transmitted disease clinics) and for asymptomatic persons at high risk for infection (e.g., persons with multiple sex partners, drug addicts, or a history of STD).

Tests commonly used:

1. **Microscopic wet mount examination:**

The most common method for *T. vaginalis* diagnosis might be microscopic evaluation of wet preparations of genital secretions because of convenience and relatively low cost.

Unfortunately, the sensitivity of wet mount is low (51%–65%) in vaginal specimens and lower in specimens from men (e.g., urethral specimens, urine sediment, and semen).

Clinicians using wet mounts should attempt to evaluate slides immediately because sensitivity declines as evaluation is delayed, decreasing by up to 20% within 1 hour after collection

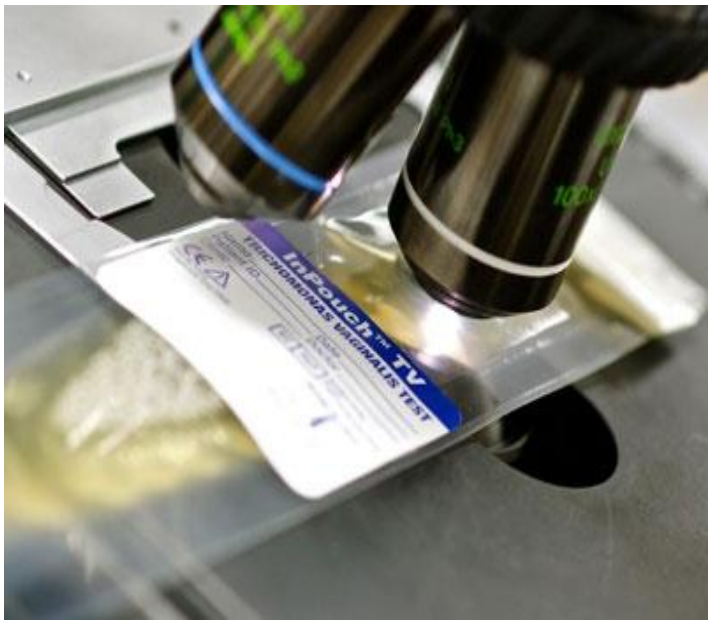
- Organisms lose motility *ex vivo* because of temperature shock, so slides should be prepared and read as soon as possible following collection in order to avoid false-negative results.
- The motile trichomonads move in a characteristic jerky and twitching pattern.

2. **Fixed smears**: may be stained with acridine orange, Papanicolaou and Giemsa stains.
3. **NAAT (nucleic acid amplification test (Aptima *Trichomonas vaginalis assay*)):**
   - It is highly sensitive (96.5%) and highly specific (97.5%), often detecting three to five times more *T. vaginalis* infections than wet-mount microscopy.
   - It is the gold standard test.
4. **Affirm VPIII: nucleic acid probe test:**
   - For the diagnosis of *T. vaginalis* as well as *Gardnerella vaginalis* and *Candida albicans* in females.
   - This test can be run and give results in 45 minutes with sensitivity 90-95% and specificity of 92-100%.
5. **OSOM *Trichomonas* Rapid Test:**
   - It is used to detect *T. vaginalis* in vaginal secretions.
   - It is an antigen-detection test uses immune chromatographic capillary flow dipstick technology that can be performed at the point of care.
   - The results of the OSOM *Trichomonas* Rapid Test are available in approximately 10 minutes, with sensitivity 82%–95% and specificity 97%–100%.
   - Self-testing might become an option.
6. **Culture with a modified diamond medium:**
   - It was considered as the gold standard method for diagnosing *T. vaginalis* infection before start of NAAT.

- Culture has a sensitivity of 75%–96% and a specificity of up to 100%.
- In women, vaginal secretions are the preferred specimen type for culture.
- In men, culture specimens require a urethral swab, urine sediment, and/or semen.
- To improve yield, multiple specimens from men can be used to inoculate a single culture.
- Cultures are assessed by microscopy of a slide prepared from a drop of the culture medium daily for up to 7 days.

7. The InPouch (Biomed Diag- nostics, Santa Clara, CA) system:

- It contains culture medium in a pouch that can be placed on a microscope stage.
- Thus, the entire volume of the culture can be evaluated for the presence of trichomonads.
- The InPouch system achieved an incremental increase in sensitivity over routine culture.
- It is used for collection , Transportation, Incubation and observation of the micro organism
- The Inpouch culture technique is as sensitive and specific as molecular techniques in detection of TV



Microscopic examination of Inpouch culture(4).

OSOM test(5).

Treatment

- Simultaneous treatment of both partners is recommended as it is an STD.
- Metronidazole 2 g orally as a single dose or 500 mg orally twice a day for 7 days is the drug of choice.
- In patients not responding to treatment with standard regime, the dose of metronidazole may be increased or it may be administered parenterally.
- In pregnancy, metronidazole is safe in 2nd and 3rd trimesters.

Prevention

- Prevention is same as for other sexually transmitted diseases.
- Avoidance of sexual contact with infected partners and use of barrier method during intercourse prevent the disease.
- Patient's sexual partner should be tested for *T. vaginalis* when necessary.
- Treatment of both partners at the same time.

Trichomonas tenax

- *T. tenax,* also known as *T. buccalis,* is a harmless commensal which lives in mouth, in the periodontal pockets, carious tooth cavities and, less often, in tonsillar crypts .
- It is *smaller (5-10* μm) than *T. vaginalis.*
- It is transmitted by kissing, through salivary droplets and fomites.
- There are sporadic reports of its involvement in respiratory infections and thoracic abscesses especially in severe lung diseases.
- Better oral hygiene rapidly eliminates the infection and no therapy is indicated.

Trichomonas Hominis

- *T. hominis* measures 8- 12 μm, ***pyriform-shaped,*** and carries *five anterior flagella* and an undulating membrane that extends the full length of the body.
- It is a *very harmless commensal* of the cecum where the organism feeds on bacteria and food debris.
- Microscopic examination of stool will reveal motile trophozoite of *T. hominis.*
- The cysts are ***lemon-shaped*** having a spiral projection at the anterior end. It measures 5-10 μm in length and 4-6 μm in breadth and is surrounded by a thick cyst wall.
- Both trophozoites and cysts are demonstrated in the semi-formed stool.

Summary:

- *T. Vaginalis* is the most important spp among all trichomonas.
- *T. Vaginalis* is sexually transmitted parasite.
- The commonest diagnostic method is microscopic examination.
- Treatment should be for both partners.

References:

1. CDC.gov
2. Microbeonline.com/laboratory-diagnosis-trichomonas-vaginalis-infections/
3. *Health Jade.com*
4. Biomed Diag- nostics, Santa Clara, CA
5. Seckisui diagnostics
6. BURTON J. Bogitsh,Clint E. Carter, and Thomas N. Oeltmann, 2013, Human parasitology 4th edition, USA and UK, Elsevier.
7. *Britanica.com*
8. Paniker J CK , 2018, *Paniker's textbook of medical parasitology*, 8th edition, Newdelhi, London , Panama, JAYPEE.
9. Labmedica.com
10. Zeibig A. Elizabeth, 2013, Clinical parasitology, USA, Elsevier