Ministery of Higher education and scientific research

University of Tikrit

College of science

Department of Biology

Lectures of Pathogenic Bacteria

For Diploma students – Pathological analyses - 2025-2026

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Gram-negative cocci, aerobic.

The genus Neisseria consists of G- , aerobic , cocci. Two Neisseria species are pathogenic for humans .

Neisseria gonorrhoeae (commonly called gonococcus). The causal agent of gonorrhea and **Neisseria meningitis** (commonly called meningococcus) afrequent cause of meningitis . Neisseria gonorrhoeae, Also known as gonococci (plural),or gonococcus (singular), is a species of Gramnegative coffee bean-shaped diplococci bacteria , frequently observed within the polymprphnuclear leukocytes.

N. gonorrhoea was first described by Albert Neisser in 1879. responsible for

the sexually transmitted infection gonorrhea, usually transmitted during :

1-Sexual contact

2- More rarely vertically (during the passage of baby through an infected birth

canal)

Structure : Gonococci are un encapsulated (unlike meningococci) , pilited , and non-motile ,and they resemble a pair of kidney beans

1- Pili : enhance attachment of organism to host epithelial and mucosal cell surface act as important virulence factors , and also antigenic.

2- Lipooligosaccharide (LOS): have shorter , more highly branched , nonrepeat O- antigen side chains than do lipopolysaccharide found in other Gbacteria . The bacterial antibodies in normal human serum are IgM molecules directed against LOS antigens . The gonococcus is also capable of high frequency variation of the LOS antigens presented on the cell surface .

3- Porin Protein : This bacteria express a single porin type , known as Por B . Different strains express either PorB1A or PorB1B .

4- Opacity proteins : Opacity (Opa) protein (formerly called PII proteins) are so named due to their tendency to impart an opaque quality to gonococcal colonies .

Pathogenesis:

1- Pili and Opa proteins facilitate adhesion of the gonococcus to epithelial cells of the urethra , rectum , cervix , pharynx ,and conjunctiva , thereby makingcolonization possible .

2- Both gonococci and meningococci produce an IgA protease that cleaves IgA1.

3- To establish infection in human males , the gonococcus must express proteins that facilitate iron acquisition from either transferrin or lactoferrin .

Clinical Significance :

A higher proportion of females than males are generally a symptomatic , and these individuals act as the reservoir for maintaining and transmitting gonococcal infection more than one sexually transmitted disease (STD) may be acquired at the same time , such as gonorrhea in combination with syphilis (Treponema pallidum infection) , chlamydia , human immune deficiency virus , or hepatitis B virus.

Patients with gonorrhea may therefore , need treatment for more than one

pathogen .

1- Genitourinary tract infections.

In male : a yellow , purulent urethral discharge and painful urination .

In female :A greenish , yellow cervical discharge is most common . often

accompanied by inter menstrual bleeding .

2- Rectal infections.

3- pharyngitis

4- Ophthalmin neonatorum : occur in new barns .

5- Disseminated infection : bacteria have limited ability to multiply to blood stream , therefore bacteria with gonococci is rare . In contrast , meningococci multiply rapidly in blood .

Note: Gonococcal infection is the most common cause of septic arthritis in

sexually active adults .

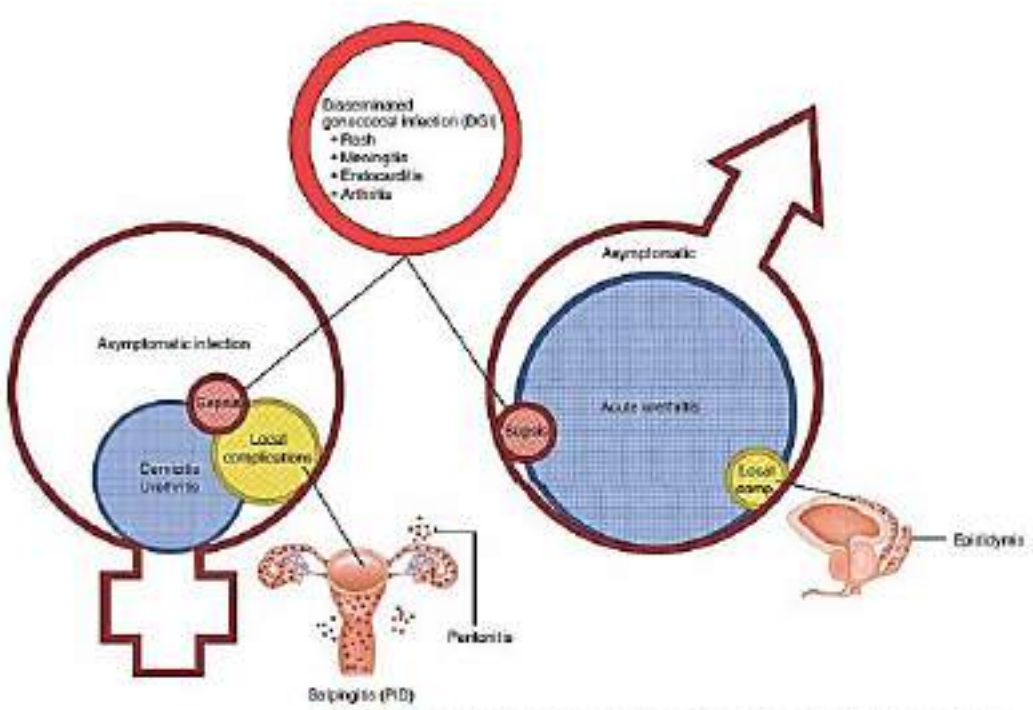

FIGURE 30-8. Gonorrhea in men and women. The majority of cases in women are asymptomatic. Local extension up the fallopian tubes causes salpingitis. The majority of men have acute urethritis, and only a small percentage have local extension to the epididymis. A very small part of either spectrum results in bacteremia and disseminated gonococcal infection.

Laboratory identification :

- In male: finding of numerous neutrophils containing G- diplococcui in a smear of urethral exudate .

- In females : a positive culture is needed to diagnosis gonococcal infection as well as at sites.

If disseminates infection is suspected . Appropriate culture : should be set up

as indicated for example of skin lesions , joint fluid , and blood .

1- Growth conditions for culture :

a- Bacteria grows : best under aerobic conditions , and most strains require

enhanced CO2 .

b- Gonococcus utilize glucose but not maltose , lactose ,or sucrose .

Meningiococcus utilize both glucose and maltose .

c- All Neisseria genus Oxidase +

2- Selective media : Gonococcus : very sensitive to heating and drying ,chocolate agar supplemented with several antibiotics that suppress the growth of nonpathogenic Neisseria and other normal and abnormal flora . The bacteria on this media appear as gold standard.

Treatment :

More than 20 % of current isolates of N. gonorrhoeae are resistant's to penicillin , tetracycline, cefoxitin ,and /or spectinomycin.

Penicillinase producing N. gonorrhoeae ,however , most organisms still respond to treatment with third generation cephalosporins .

Prevention:

Gonorrhea involves evaluating and arrangement of sexual contacts of the patient

1- Generally using antibiotics as prophylactically in an exposed individual even

in the observe of symptoms .

2- Barrier methods

Neisseria meningitids

Is one of the most frequent causes of meningitis when meningococcus is isolated from blood or spinal fluid , its invariably encapsulated . The meningococcal polysaccharide capsule is antiphagocytic . Antibodies to capsule carbohydrate are bactericidal . According to the epidemiological classification , this bacteria is classified in to > 13 serogroups depended on polysaccharide capsule and > 20 serotypes depended on outer membrane proteins .

Most infections are caused by serogroups A,B,C,W-135 , and Y(approximately 90% are due to A,B,C). The meningococcus express Por A and Por B-type porins .

Epidemiology :

Transmission occurs through inhalation of respiratory droplets from a carrier or a patients in the early stages of the disease . In addition to contact with carrier , risk factors for disease include recent viral or mycoplasma upper respiratory tract infection, active or passive smoking , and complement deficiency .