Case Studies- Introduction to Genitourinary Diseases

We begin this text with a discussion of infections of the genitourinary tract for two reasons. First, the number of microorganisms which frequently cause infection in these organs is somewhat limited. Second, urinary tract infections (UTIs) and sexually transmitted diseases (STDs) are two of the most common reason why young adults, particularly women, consult a physician. UTIs are examples of endogenous infections, i.e., infections which arise from the patient's own microflora. In the case of UTIs, the microbes generally originate in the gastrointestinal tract and colonize the periurethral region before ascending the urethra to the bladder. STDs are exogenous infections; i.e., the infectious agent is obtained from a source outside the body. In the case of STDs, these agents are obtained by sexual contact.

UTIs are much more common in women than men for a number of reasons. The urethra is shorter in women than in men, making it easier for microbes to ascend to the bladder. Prostatic secretions are antibacterial, which further protects the male. The periurethral epithelium in women, especially women with recurrent UTIs, is more frequently colonized with microorganisms which cause UTIs. It should also be noted that the incidence of UTIs is higher in sexually active women, as coitus can "force" organisms colonizing the periurethral region into the urethra. The incidence of nosocomial UTIs, however, is similar in women and men. In these infections, catheterization is the major predisposing factor.

The incidence of STDs is similar in both heterosexual men and women; however, the morbidity associated with these infections tends to be much greater in women. In particular, irreversible damage to reproductive organs, caused by both *Chlamydia trachomatis* and *Neisseria gonorrhoeae*, is all too common. Whereas infections with these two organisms are almost always symptomatic in males, a significant number of women may be infected asymptomatically at first. They may manifest signs and symptoms of infection only when they develop pelvic inflammatory disease, which can result in sterility. Fetal loss or severe perinatal infection may be caused by two other STD agents, herpes simplex virus and *Treponema pallidum*, the etiologic agent of syphilis.

Important agents of genitourinary tract infections are listed in the table below. Only organisms in this table should be considered in your differential diagnosis for the cases you have been provided. You should note that not all organisms that can be spread sexually, such as hepatitis B virus and *Entamoeba histolytica*, are listed. This is because these infections do not have genitourinary tract manifestations.

Organism	General characteristics	Source of infection	Disease manifestation [°]	
Bacteria				
Actinomyces spp.	Anaerobic, gram-positive bacilli	Endogenous	PID associated with intrauterine device usage	
Bacteroides fragilis	Anaerobic, gram-negative bacillus	Endogenous	Pelvic abscess	
Chlamydia trachomatis	Obligate intracellular pathogen (does not Gram stain)	Direct sexual contact	Urethritis, cervicitis, PID	
Enterobacter spp.	Lactose-fermenting gram- negative bacilli	Endogenous	Community or nosocomial UTI	
Enterococcus spp.	Catalase-negative, gram-positive cocci	Endogenous	Nosocomial UTI	
Escherichia coli	Lactose-fermenting gram- negative bacilli	Endogenous	Community or Nosocomial UTI	
Haemophilus ducreyi	Fastidious pleiomorphic gram negative bacillus	Direct sexual contact	Chancroid (painful genital ulcer)	
Klebsiella pneumoniae	Lactose-fermenting gram- negative bacilli	Endogenous	Community or nosocomial UTI	
Morganella morganii	Lactose non-fermenting gram- negative bacillus	Endogenous	Community or nosocomial UTI	
Neisseria gonorrhoeae	Gram-negative intracellular diplococcus	Direct sexual contact	Urethritis, cervicitis, PID	
Proteus mirabilis	Lactose non-fermenting, swarming gram-negative bacillus	Endogenous	Community or nosocomial UTI	

Genitourinary Tract Pathogens

Pseudomonas	Lactose non-fermenting gram-	catheterization	Nosocomial UTI		
Gradulasa					
Staphyloccus	Coagulase-negative, gram-	Catheterization,	Nosocomial UTI, Community-acquired		
epidermidis	positive coccus	endogenous	UTI, biofilm agent		
Staphylococcus	Catalase-positive, gram-positive	Endogenous	Community-acquired LITI		
saprophyticus	coccus	Lindogenous	community acquired off		
Treponema pallidum	Spirochete (does not Gram stain)	Direct sexual contact; vertical, from mother to child	Chancre (painless genital ulcer); primary, secondary, tertiary syphilis; neonatal syphilis		
Fungi					
Candida sp.	Yeast with pseudohyphae	Endogenous	Vaginitis, nosocomial UTI		
Parasites		·			
Phthirus pubis	Crab lice	Direct sexual	Pubic hair infestation		
		contact			
Trichomonas		Direct sexual	Vaginitis		
vaginalis	Protozoan	contact			
Viruses					
Herpes simplex virus	Enveloped DNA virus	Direct sexual			
		contact; vertical,	Recurrent genital ulcers, fetal/neonatal		
		from mother to	infections, encephalitis		
		child			
Human immunodeficiency virus (HIV)	Retrovirus	Direct sexual			
		contact, blood;	AIDS, neonatal infection, dementia		
		vertical, from			
		mother to child			
Human papillomavirus	Nonenveloped DNA virus	Direct sexual	Genital warts, cervical carcinoma		
		contact			
		1			

Case One

Ms. C., a 14-year-old female, came to the emergency room with an acutely painful abdomen. Her temperature was 38.5°C, and laboratory tests indicated an elevated white blood cell count and sedimentation rate. Before results of the urinalysis and a pregnancy test were returned, a pelvic examination revealed a purulent cervical discharge. A culture was sent, and a Gram stain of the discharge was prepared and examined (see below). Abdominal tenderness was apparent during the bimanual examination.

Ms. C. reported that her last menses was 4 days ago. When asked about her sexual behavior, she told the resident physician that she had intercourse for the first time 2 years ago. That relationship ended a few months ago, and she recently began "going steady" with a new friend. She and her partners have never used condoms or any other form of birth control.



1. What test should be ordered for the cervical specimen and what organism do you suspect is causing the disease?

2. Assuming that Ms. C. has PID, how did she acquire the infection?

3. What feature of this disease-causing organism prevents her from developing immunity and being immune to catching this STD in the future?

Case Two

A 26-year old white female presents in her physician's office with genital itching and sharp, severe pain on the labia. She complains of three previous episodes of pain over the past 6 months, each of which were followed by the appearance of red sores which crusted and healed without a scar.

On examination the physician observes a cluster of small red blisters localized in the area of the worst pain. No significant discharge was observed from the vagina. The patient's urine was clear and yellow. Urinalysis revealed normal specific gravity, no sugar, no protein, no white blood cells or red blood cells and no bacteria. The patient's temperature was 36.5C.

The patient history reveals that she is unmarried. She is moderately sexually active and currently using an oral contraceptive which she has been taking for about 4 years. The woman stated that she has had 5 sexual partners over the past year. She reported that her episodes have become progressively more severe.

- 1. What is the cause of this woman's complaint?
- 2. As her physician, would you recommend that this woman modify her sexual activity?
- 3. Is there an effective treatment for this condition?
- 4. What serious long-term risk does this woman have?

Case Three

An 18-year-old coed came to the infirmary at the University of Florida complaining of nausea and left flank pain. She has been having fevers and chills off and on for about five days. The chills and fever started at about the time that she noted increased urinary frequency with some burning and pain when she urinated. She took some amoxicillin that had been given to her four months ago for cystitis. That infection had been successfully treated by the amoxicillin, but it didn't seem to be having an effect on this infection. Today she is somewhat worried because she has noted some blood in her urine.

You examine the patient and ask her for a urine sample. You note a temperature of 39° C, and your physical examination shows left costovertebral angle tenderness. You note that the urine sample of your patient is cloudy and frankly foul smelling. The Gram stain of the sediment showed more than 50 white blood cells per high-power field and the microbe shown below (Figure 1). Several red blood cells were also seen. The organism was also plated on MacConkey's agar shown below (Figure 2).



Figure 1



Figure 2

- 1. What is the most likely site of the problem? What is an infection of this organ called?
- 2. What organism is most likely causing the disease?
- 3. What tests would you order to confirm the diagnosis?
- 4. Why are woman more commonly affected by this condition than men?