

Urinary Tract Infections

DR. AHMED HASAN MOHAMMED

Introduction

Bacterial colonization of the urine within this tract (**bacteriuria**) is common and can at times result in microbial invasion of the tissues responsible for the manufacture, transport, and storage of urine.

Infection of the upper urinary tract, consisting of the kidney and its pelvis, is known as **pyelonephritis**. Infection of the lower tract may involve the bladder (**cystitis**), urethra (**urethritis**), or prostate (**prostatitis**), the genital organ that surrounds and communicates with the first segment of the male urethra.

Because all portions of the urinary tract are joined by a fluid medium, infection at any site may spread to involve other areas of the system.

Pathogenesis

- The urine produced in the kidney and delivered through the renal pelvis and ureters to the urinary bladder is sterile in health.
- Infection results when bacteria gain access to this environment and are able to persist. Access primarily follows an ascending route for bacteria that are resident or transient members of the perineal flora.
- These organisms are derived from the large intestinal flora, which is uncomfortably nearby. Conditions that create access are varied, but the most important is sexual intercourse, which has been shown to transiently displace bacteria into the bladder. This puts the female partner at risk because of the short urethral distance.

Etiologic Agents

Over 95% of UTIs are caused by Gram-negative rods, and 90% of these are *E coli*.

Other Enterobacteriaceae, *Pseudomonas*, and Gram-positive bacteria become increasingly common with chronic, complicated, and hospitalized patients.

Of the Gram-positive bacteria enterococci are the most important. *Staphylococcus saprophyticus*, a coagulase-negative staphylococcus, is now recognized as the cause in a significant minority of symptomatic infections in young, sexually active women.

Yeasts, particularly species of *Candida*, may be isolated from catheterized patients receiving antibacterial therapy and from diabetic individuals, but they seldom produce symptomatic disease. ::: *S saprophyticus* UTI

Manifestations

Cystitis

The symptoms of cystitis are **dysuria** (painful urination), **frequency** (frequent voiding), and **urgency** (an imperative "call to toilet").

Pyelonephritis

The typical presentation of upper urinary infection consists of **flank pain** and **fever** that exceeds 38.3°C. These findings may be preceded or accompanied by manifestations of cystitis. Rigors, vomiting, diarrhea, and tachycardia are present in more severely ill patients.

Prostatitis

Infection of the prostate is typically manifested as pain in the lower back, perirectal area, and testicles. The same bacteria that cause cystitis and pyelonephritis are involved. In acute infection, the pain may be severe and accompanied by high fever, chills, and the signs and symptoms of cystitis. Inflammatory swelling can lead to obstruction of the neighboring urethra and urinary retention.

Diagnosis

Specimen Collection

Although the contaminants can never be completely eliminated, their quantity may be diminished by carefully cleansing the periurethrum before voiding and allowing the initial part of the stream to flush the urethra before collecting a specimen for examination. This **clean-voided midstream urine** collection procedure is preferred to catheterization for routine purposes because it prevents the introduction of organisms into the bladder.

Microscopic Examination

Approximately 90% of patients with acute symptomatic UTI have pyuria (that is, more than 10 white cells/mm³ of urine). This finding is also common, however, in a number of noninfectious diseases. More specific is the presence of white cell casts, which occur primarily in patients with acute pyelonephritis.

Chemical Screening Tests

The most successful detects leukocyte esterase from inflammatory cells and nitrite produced from urinary nitrates by bacterial metabolism. Although technically simpler, the sensitivity and specificity of these products are similar to that of microscopic examination. Like microscopic examination, they do not reliably detect bacteriuria below the level of 10^5 organisms/mL.

Urine Culture

Perhaps no number in medicine is better known or more slavishly adhered to than 10^5 bacteria/mL of urine. Higher than it is UTI, lower than it is contamination.

Treatment

The treatment of UTI is best guided by the results of cultures and antimicrobial susceptibility tests. In simple isolated instances of cystitis in a young woman, the etiology is often assumed to be *E coli* and the antimicrobial selected empirically based on knowledge of the susceptibility of local strains. Sulfonamides and trimethoprim alone or in combination with sulfamethoxazole, a fluoroquinolone, and nitrofurantoin are the agents most commonly used.