

Urinary tract infections (UTI)



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Introduction

INTRODUCTION

ACQUISITION AND ETIOLOGY OF UTI

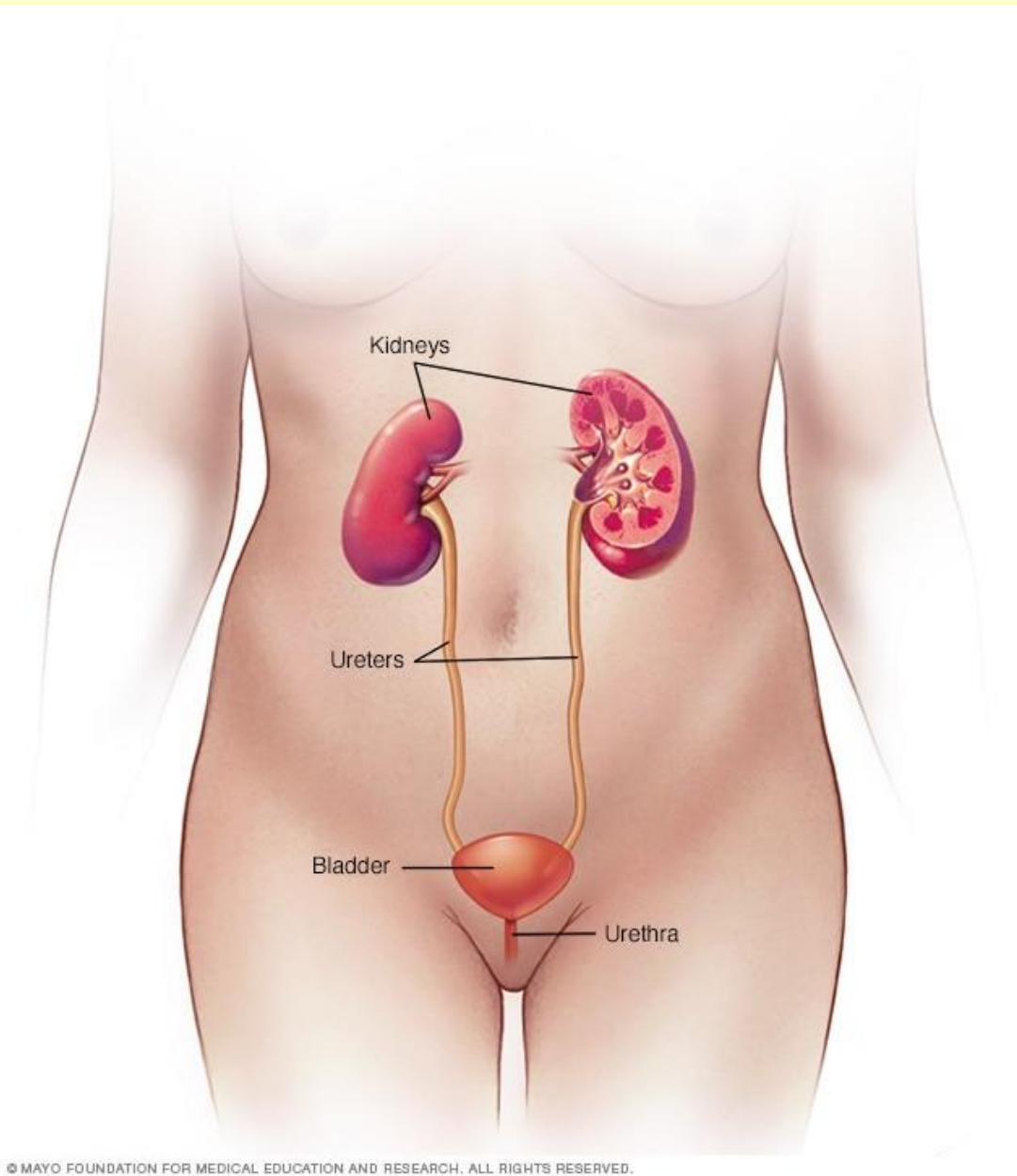
PATHOGENESIS

CLINICAL FEATURES AND COMPLICATIONS

LABORATORY DIAGNOSIS

TREATMENT OF UTI

PREVENTION



Anatomy of urinary tract

INTRODUCTION

- * The second most common infectious disease in the body**
- * Women – up to 20% have UTI at some time in their life and a significant number of recurrent infections**

ACQUISITION AND ETIOLOGY OF UTI

- * Ascending: urethra – bladder – kidney.**
Occasionally bacteria infecting the UTI invade the bloodstream to cause **septicemia (urosepsis)**.
- * Hematogenous: spread from any organ to the kidney.**

BACTERIAL ETIOLOGIC AGENS

ASCENDING INFECTIONS

* Community acquired: *Escherichia coli*, other enterobacteria (e.g. *Proteus mirabilis* – often associated with urinary stones, it produce urease to produce ammonia, rendering the urine alkaline.)

Staphylococcus saprophyticus – young sexually active women

* Health-care associated: e.g. *Klebsiella*, *Serratia*, *Pseudomonas*, *Enterococcus* their resistance favours their selection

HEMATOGENOUS SPREAD: *S. aureus*, *Salmonella Typhi*, *Mycobacterium tuberculosis*

VIRAL ETIOLOGIC AGENTS

Polyomaviruses BK and **JC** are **ubiquitous viruses** with high seroprevalence rates in general population. Following primary infection, polyomaviruses BK and JC **persist latently** in different sites, particularly in the **reno-urinary tract**. Reactivation from latency may occur in normal subjects with asymptomatic viruria, while it can be associated to **nephropathy (polyomavirus-associated nephropathy, PVAN) in kidney transplant recipients**. PVAN may occur in 1%-10% of renal transplant patients with loss of the transplanted organ in 30% up to 80% of the cases. Etiology of PVAN is mainly attributable to BK virus, although approximately 5% of the cases may be due to JC.

Hantaviruses – reservoir/rodents – benign or serious (fatality 10%)

OTHER ETIOLOGIC AGENS

Other bacteria

Leptospira – reservoir/rodents, febrile infection, damage epithelium of blood vessels, renal and hepatic failure, Dg-serology, **therapy** - doxycycline

M. tuberculosis – irregular leukocyturia, Dg- culture, PCR

Yeast, fungi

Candida spp. etiology around 7% of UTI.

All invasive fungi (e.g., *Cryptococcus neoformans*, *Aspergillus sp*, *Mucoraceae sp*, *Histoplasma capsulatum*, *Blastomyces sp*, *Coccidioides immitis*) may infect the kidneys as part of systemic or disseminated mycotic infection. Their presence alone indicates infection.

Parasites

Schistosoma hematobium result in inflammation of the bladder and commonly hematuria. The eggs penetrate the bladder wall (obstruction of the ureter can lead to hydronephrosis)

FACTORS FAVOURING UTI

Bacterial attributes

- 1. Capsular antigens**
- 2. Hemolysins**
- 3. Urease**
- 4. Adhesions to uroepithelium - P fimbriae *E. coli***

Host factors

- 1. Renal calculi**
- 2. Ureteric reflux (tumors, pregnancy, bladder stones, neurologic disorders – residual urine)**
- 3. Prostatic hypertrophy**
- 4. Short uretra**
- 5. Catheterization**

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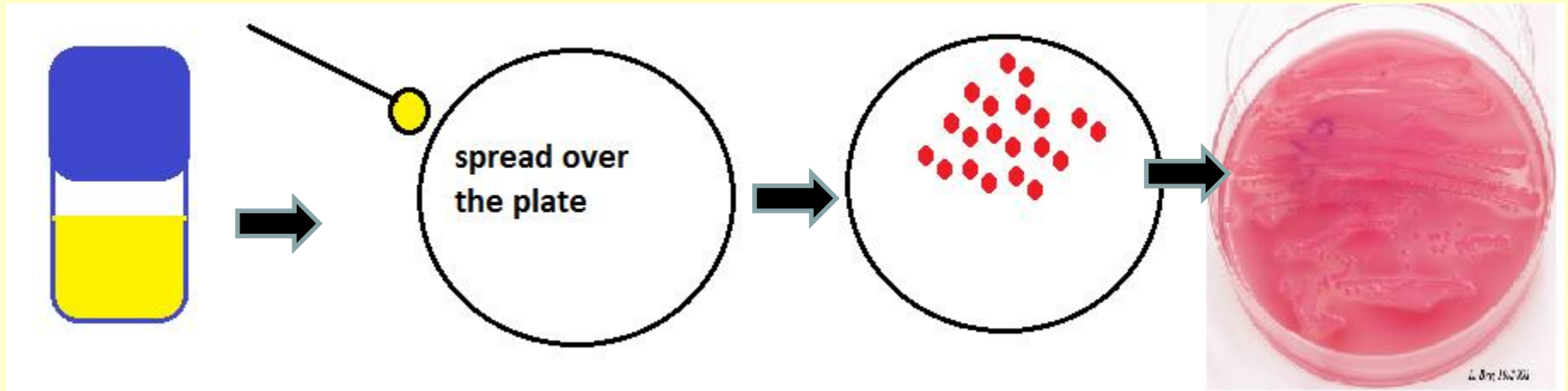
Specimen collection

Distal uretra is colonized commensal –periurethral and faecal organisms

Specimen transport – middle stream urine after cleaning of external genitalia with water and soap, should be processed within 1 hour or held at 4C for not more than 18 hours

Significant bacteriuria – result and interpretation < 10^3 ml contamination (not infection), > 10^5 ml significant bacteriuria (infection), **exception** – this number is modified by the clinical situation, the sampling technique and the identity of the suspected pathogen, for example a CFU of 10^2 is considered significant when urine is sampled by suprapubic puncture, **upper urinary tract infections** – pyelonephritis could be lower

LABORATORY DIAGNOSIS OF UTI



Urine

agar inoculation

10^3 bacteria/ml

10^5 bacteria/ml



Identifikace (MALDI TOF)



antibiotic
susceptibility
test

treatment

TREATMENT OF UTI

Lower UTI

3 days – cotrimoxazol or quinolones

5 days – betalaktams (aminopenicillines, cephalosprins of 1st and 2nd generation) or nitrofurantoin

Upper UTI

Pyelonephritis - 2 weeks one of the listed below:

cotrimoxazol, quinolones, betalaktams

(aminopenicillines, cephalosprins 2nd generation)