

Revised by

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team 436



Lecture : Cystitis

■ important

■ Extra notes

■ Doctors notes

"لا حول ولا قوة إلا بالله العلي العظيم" وتقال هذه الجملة إذا داهم الإنسان أمر عظيم لا يستطيعه ، أو يصعب عليه القيام به .

Objectives:

- 1-To define the term cystitis and who is commonly get cystitis.
 - 2- To describe the pathogenesis and risk factors of cystitis.
 - 3- To know the most common causative organisms of cystitis
 - 4- To recognize different types of cystitis (infectious and non-infectious).
 - 5- To recognize that venereal diseases can present with cystitis.
 - 6- To understand the laboratory diagnostic of cystitis
 - 7-To know the antimicrobial agents suitable for the treatment and prevention of cystitis.
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Introduction and classification:

- Urinary Tract infection (UTI) divided into:

upper UTIs:	lower UTIs:
Acute pyelonephritis and chronic pyelonephritis	<ul style="list-style-type: none">✓ Cystitis: (infection of the bladder: a superficial mucosal infections)✓ Urethritis: (sexually transmitted pathogens in men & women)✓ Prostatitis and Epididymitis

- Bacteriuria:

1. **Symptomatic bacteriuria:** Patient presents with **urinary symptoms** and **significant bacteriuria** (**10⁵** bacteria/ml)
2. **Asymptomatic bacteriuria:** the patient presents with **significant bacteria** in urine but **without symptoms** (**kidney transplant, pregnant lady**)

- They are classified according to the factors that trigger the infection into:

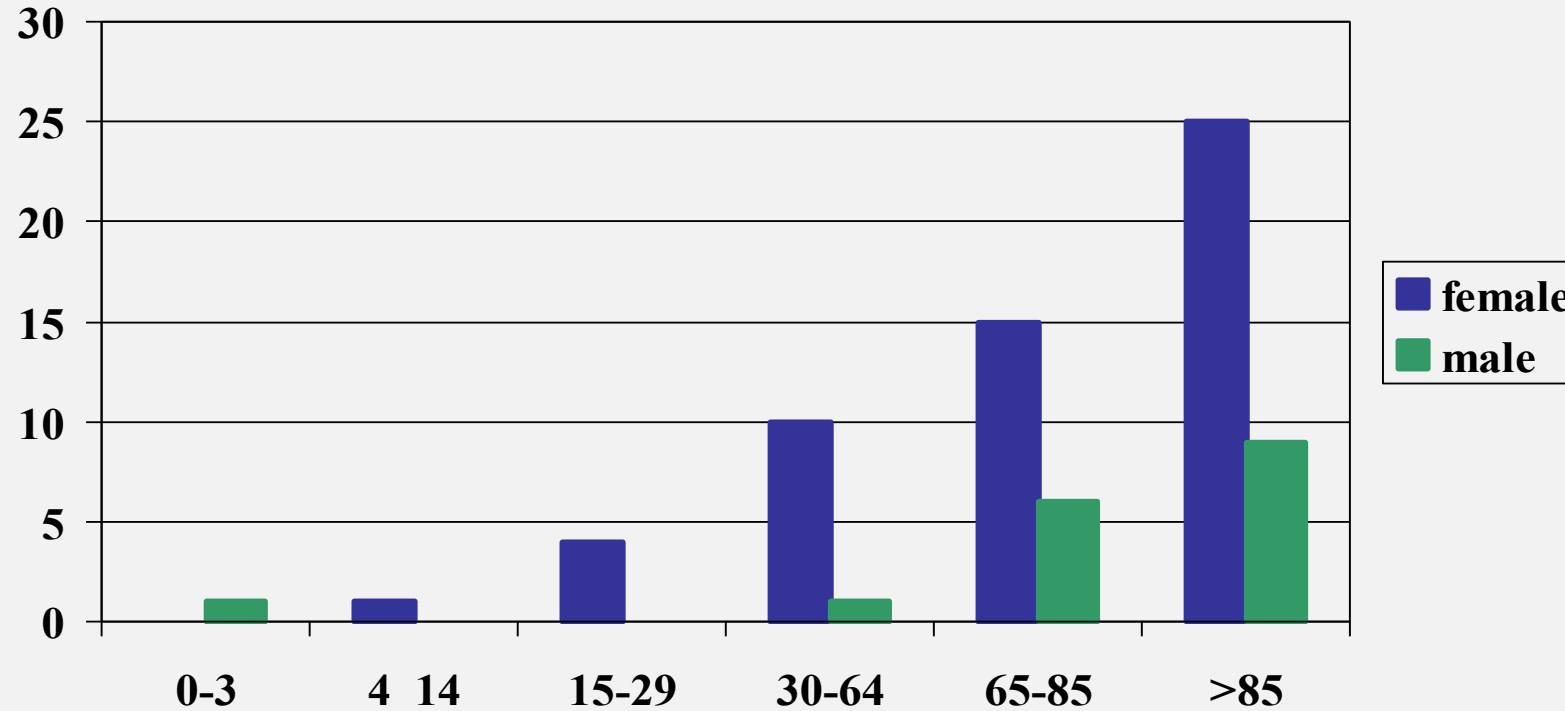
1. **Uncomplicated UTI:** (empirical therapy is possible)(**occur at the first time , empirical=no need for culture , only give antibiotic for 3 days**)
2. **Complicated UTI:** (nosocomial UTI, relapses, structural or functional abnormalities)(**patient with catheter or diabetes or pregnant**)

Remember that urine is sterile. / significant bacteriuria means present of huge number of bacteria in the urine

Prevalence (انتشار) of Bacteriuria in different age groups:

As age increases the incidence of UTI increases especially in females

The incidence of the male is increase with ages due increase the risk of prostatitis and stasis of urine Diabetes



Cystitis: infection of the bladder

<p>In women is common due to a number of reasons</p>	<ul style="list-style-type: none">- Short urethra (allow bacterian to ascend directly to the bladder)- Pregnancy (hormonal changes flowed by changes in the normal flora , progesteron will cause dilation of the bladder and will cause urine stasis so bacteria will colonized easily)- Decreased estrogen production during menopause.
<p>In men</p>	<p>mainly due to persistent bacterial infection of the prostate. (usually men how get prostatitis are in middle age)</p>
<p>In both sexes:</p>	<ul style="list-style-type: none">- Presence of bladder stone(stone is a foreigner body which allow colonization of bacteria)- Urethral stricture(تقلصات او عيوب خلقيه)- Catheterization of the urinary tract- Diabetes mellitus(diabetic are more liable to get cystitis)

Pathogenesis:

1. Infection results when bacteria ascends to the urinary bladder causing frequent irritation of the mucosal surfaces of the urethra and the bladder.
 2. These bacteria are residents or transient members of the perineal flora, and are derived from the large intestine flora. (the source of the bacteria is endogenous from the same person , the disease can not be transmitted from patient to patient)(endogenous = نفس البكتيريا تكون موجودة في المريض ولكن تنتقل من مكان إلى آخر وتسبب انفكشن)
 3. Toxins produced by **uropathogens**. such as some type of E.coli
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Pathogenesis of cystitis

- Conditions that create access to bladder are:
 - Sexual intercourse due to short urethral distance.
- Uncomplicated UTI usually occurs in non pregnant , young sexually In sexually active female without any structural or neurological abnormality

Risk factors :

- Catheterization of the urinary bladder , instrumentation
 - **Structural abnormalities** specially in children who have reflex
 - Obstruction **tumor or stone**
 - Haematogenous through blood stream (**less common**) from other sites of infection
(infection in any other part in the body and the bacteria go through the blood to the urinary bladder and cause infection but this it very rare), (Staphylococcus aureus and renal TB if we see it in urine we should do blood culture because is unusual to be found in urine)
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Etiologic agents:

Bacteria	GRAM -VE: 1-E.coli is the most common (90%) cause of cystitis.(normal flora in the colon) 2-Other Enterobacteriaceae include (Klebsiella pneumoniae, Proteus spp.) 3-Other gram negative rods eg. P.aeruginosa.(pseudomonas usually associated with structural abnormality , hospital acquired)
	GRAM +VE: 1-Enterococcus faecalis .(usually associated with catheter) 2-group B Streptococcus 3-Staphylococcus saprophyticus (honeymoon cystitis, only affect active sexual female)
	Venereal diseases: (gonorrhea, Chlamydia) may present with cystitis. (sexually transmitted)
Fungi:	Candida species (normal flora of vagina , diabetes and taking contracepted pills can cause over growth of candida)
Parasite	Schistosoma hematobium : in endemic areas such as Egypt and south of Saudi Arabia. (with terminal hematuria)
Special cases:	(S. epidermidis) / S. saprophyticus / Yeasts (catheter related result) / Viruses (Adeno, Varicella) / Chlamydia trachomatis (causes venereal diseases)

Uncomplicated UTI	Complicated UTI (often multi-resistant strains)
E. coli (64%) Enterobacteriaceae (16%) Enterococcus spp (20%) Pseudomona spp (<1%) S. aureus (<1%)	E. coli Enterobacteriaceae Pseudomonas spp Acinetobacter spp

} % is not possible to judge
Judge often multi-resistant strains

We can list them according to the most common:

- 1-E.coli & Enterobacteriaceae
- 2- Group B streptococcus & Saprophyticus
- 3-Enterococcus faecalis
- 4- pseudomonas aeruginosa.

Clinical presentation:

- Symptoms usually of acute onset.
 - ✓ **Dysuria** (painful urination) (Very sever pain and it is more common in females)
 - ✓ Frequency (frequent voiding) (the urine amount is low but the urination frequency in high)
 - ✓ Urgency (an imperative call for toilet)
 - ✓ Hematuria (blood in urine) in 50% of cases.
 - ✓ **Usually no fever.**
 - ✓ **Suprapubic tender pain.**

Dysuria and frequency			
Cystitis (80%)	Urethritis (10-15%)	Vaginitis (5%)	Non-infectious (<1%)
-E. coli, -S. saprophyticus -Proteus spp. -Klebsiella spp. Without discharge	-C. trachomatis, -N. gonorrhoeae -H. simplex -Other bacteria With urethra discharge	-Candida spp. -T. Vaginalis	-Hypoestrogenism -Functional obstruction -Mechanical obstruction -Chemicals

Urosepsis is sepsis that complicates a urinary tract infection, and is more likely to occur in the elderly with changes in their mental status. So you have to take both blood and urine sample, because its growth faster in urine, and if you find the same bacteria in blood that conform UTI.

How to differentiate between cystitis and urethritis ?

- Cystitis is of more acute onset **and sudden**
- More severe symptoms
- Pain, tenderness on the supra-pubic area.
- Presence of bacteria in urine (bacteriuria)
- Urine cloudy, malodorous and may be bloody (**malodorous=bad smell**)

Differential diagnosis : (types of cystitis)

- Non-infectious cystitis such as:
 1. Traumatic cystitis in women (**after delivery**)
 2. Interstitial cystitis (unknown cause, may be due to autoimmune attack of the bladder)
(**autoimmune attack**)
 3. Eosinophilic cystitis due to Schistosoma hematobium
 4. Hemorrhagic cystitis due to radiotherapy or chemotherapy.(**in patient with malignancy**)
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Laboratory diagnosis of cystitis

1- Specimen collection:

- Most important is clean catch urine [Midstream urine (**MSU**)] to bypass contamination by perineal flora and must be before starting antibiotic. (patient must clean the area before tacking the urine then throw the first drops)
- Supra-pubic aspiration or catheterization may be used in children.
- Catheter urine should not be used for diagnosis of UTI. (never tack sample for culture from the catheter container because it will be contaminated)

2- Microscopic examination: (of the urea)

- About 90% of patients have > 10 WBCs /cumm
- Gram stain of uncentrifuged sample is sensitive and specific.
- One organism per oil-immersion field is indicative of infection.
- Blood cells, parasites or crystals can be seen

Urinalysis (sample collected after fluid therapy)

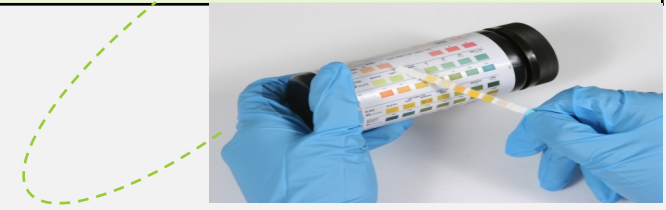
Specimen	Cystocentesis
Color	Yellow
Appearance	Cloudy
Specific gravity	1.014
pH	5.5
Protein	Trace
Glucose	3+
Ketones	1+
Bilirubin	1+
Blood	2+
Urobilinogen	0.2
Bacteria	Negative
Epithelial cells	0-3

Midstream urine = clean catch urine

Laboratory diagnosis of cystitis: coun..

3- Chemical screening tests: (not accurate or significant)

Urine dip stick –rapid ,**detects nitrites released by bacterial metabolism** (indicate gram -) and leucocyte esterase from inflammatory cells. **Not specific.**



4- Urine culture: (to confirm the diagnosis)

- important to identify bacterial cause and antimicrobial sensitivity .
- **Quantitative culture** typical of UTI (>100,000 /cumm) Lower count (<100,000 or less eg. 1000/cumm) is indicative of cystitis if the patient is symptomatic.

- How can we count this number in the lab ? Quantitation in dilution X dilution factor

(يعني بدل ما نأخذ مل من اليورن، نأخذ جزء من الالف من مل أو جزء من المئة من مل، ونضعها على بليت ونعددها لو طلعت ١٠٠ نضربها بفاكتر التخفيف لو مثلنا اخذنا جزء من الف نصير نضربها بألف وهكذا)

- How do they determine this specific number ?

Normally urine is sterile in bladder, once it reaches the urethra it catches some bacteria. So if we take urine sample from normal population without UTI we may find bacteria but should be less than 100000. While if we take it from patients with UTI most of them have 100000 or more, except two or three of them, So this significant number very well demarcated area to differentiate between symptomatic and asymptomatic.



Recurrent cystitis:

- Three or more episodes of cystitis /year
- Requires further investigations such as Intra-Venous Urogram (IVU) or Ultrasound to detect obstruction or congenital deformity.
- Cystoscopy required in some cases.

Treatment:

- Empiric treatment commonly used **depending on the knowledge of common organism*** and sensitivity pattern.
- Treatment best guided by susceptibility pattern of the causative bacteria.
- Common antimicrobial agents: Ampicillin, Cephadrine, Ciprofloxacin, Norfloxacin, nitrofurantoin (lower UTI), cephalosporin (pregnant women), Gentamicin or Trimethoprim-Sulfamethoxazole (TRM-SMX).
- Duration of treatment:
 - Uncomplicated : 3 days (3-7 days)
 - Complicated and recurrent: 10-14 days (2 weeks)
- Prophylaxis required for recurrent cases by Nitrofurantoin or TRM-SMX .
- Prevention : drinking plenty of water and prophylactic antibiotic.

*Most common type In the society

Cystitis : is an inflammation in the urinary bladder

Types of cystitis	Complicated	<ol style="list-style-type: none"> Nosocomial In structural or functional abnormalities upper UTI 	
	Uncomplicated	<ol style="list-style-type: none"> Non-pregnant sexually active females empirical therapy is possible. 	
Risk factor	In women	Short wide urethra, Pregnancy, menopause	
	In men	Persistent bacterial infection of the prostate	
	In both sexes	bladder stone, Catheterization , Diabetes mellitus, Genetic predisposing factors	
Pathogenesis	Bacteria (perineal flora) ascend from urethra -> to bladder -> frequent irritation -> inflammation		
Etiology	Complicated	1-E.Coli (most common) 2-Enterobacteria 3-gram -ve(Pseudomonas,hospital acquired) 3-Acinetobacter	
	Uncomplicated	1-E.Coli 2-Enterococcus species(honeymoon cystitis) 3-Enterobacteriaceae 4-Pseudomonas/Staphylococcus aureus(hematogenous spread).	
Clinical presentation	Dysuria • Frequency • Urgency • Hematuria • no fever		
Laboratory Investigations	<ol style="list-style-type: none"> Specimen collection>>Collect a sample of midstream urine Microscopic examination > WBC in urine & crystals can be seen Chemical screening tests >> Urine dipstick to detect nitrites and leukocyte esterase Urine culture to identify the bacteria 		
Treatment (Empiric treatment)	Common agents: <ul style="list-style-type: none"> Aciprofloxacin Gentamicin Trimethoprim-sulfamethoxazole Ceftriaxone. 	Duration of treatment: <ol style="list-style-type: none"> 3-7 days for uncomplicated cystitis. 10-14 days for complicated and recurrent cystitis. 	prophylactic antibiotic <ul style="list-style-type: none"> Nitrofurantoin (only in lower UTI) Trimethoprim-sulfamethoxazole

MCQs :

1) Which one of the risk factors of Cystitis is specific for women:

- A- Persistent bacterial infection of the prostate.
- B- Genetic factors.
- C- Short wide urethra
- D- Both B and C.

Ans: C

2) Type of non-infection cystitis which occurs due to radiotherapy or chemotherapy:

- A- Traumatic cystitis.
- B- Interstitial cystitis.
- C- Hemorrhagic cystitis

Ans: B

3) Which of the following represents lower UTI symptoms:

- A- Dysuria.
- B- Hematuria.
- C- Usually no fever.
- D- All of the above.

Ans : D

4) Which is the most common cause of Cystitis:

- A- Klebsiella pneumoniae.
- B- E.coli.
- C- Staphylococcus saprophyticus
- D- pseudomonas aeruginosa

Ans : B

5) Catheter urine is the best method is being used in UTI diagnosis

- A- true
- B- false

Ans : B

6) 25 years old married lady came to the hospital complaining from recurrent UTI. She was prescribed with prophylactic antibiotic . Which one of these is she taking

- A- Flouroquinolones
- B- amoxicilin
- C- cephalosporins
- D- Nitrofulantoin

Ans : D

Thanks to 436 team

GOOD LUCK!

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We are waiting for your feedback



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