

College of Medicine

Department of Medical Education

Curriculum Development Unit

Template for a lecture summary

Year 1

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| Title of the lecture: Cystitis  |

Lecturer’s name: Hanan Habib …& Ali Somily……………………………………..

Department : Pathology

Block /week : Renal block /Week 2

Email address : …hahabib@ksu.edu.sa & ali.somily@gmail.com

Objectives of the lecture:

1- To define the term cystitis and patients 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 ( specimen collection, microscopic examination, chemical screening tests and urine culture).

7-To know the antimicrobial agents suitable for the treatment and prevention of cystitis.

Background:

Cystitis is an acute infection of the urinary bladder , common in women .The infection is localized to the bladder and usually there is no bacteremia. There are a number of reasons why women are susceptible , including short urethra ,sexual intercourse, pregnancy, decreased production of estrogen during menopause. In men, the most common cause of cystitis is persistence bacterial infection of the prostate .In both sexes, common risk factors are the presence of bladder stone, urethral stricture, catheterization of the urinary tract and diabetes mellitus.

Pathogenesis : Cystitis is produced by frequent irritation of the mucosal surface of the urethra and the bladder. Infection results when the bacteria got access to the urinary bladder. These are usually flora of the large intestine. Toxins may be produced by uropathogens.

The most common etiologic agents are bacterial species, and 90% of these are *E.coli*, others include; *Klebsiella pneumoniae ,Proteus* spp. *Pseudomonas* and gram positive bacteria ( *Enterococcus fecalis* , group *B Streptococcu*s & *Staphylococcus saprophyticus* [ honeymoon cystitis]) are increasingly frequent causes . *Candida* species isolated from diabetic or catheterized patients receiving antibiotics . Parasitic infection caused by *Schistosoma hematobium* in endemic areas.

Symptoms of cystitis are usually of acute onset and these include ; painful sensation of urination (dysuria ) , frequency ,urgency and hematuria in 50% of patients. Venereal diseases ( gonorrhea & *Chlamydia* ) can present with symptoms similar to cystitis. Cystitis can be differentiate it from urethritis in that it is of acute onset with dysuria, may be hematuria and pubic pain. Urine in cystitis is cloudy , malodorous and may be bloody.

Differential diagnosis ( types of cystitis): several distinct types of cystitis that have no infectious causes . These are:

1-Traumatic cystitis which common in females,

2-Interstitial cystitis with unknown cause , probably autoimmune attack of the bladder

3- Eosinophilic cystitis may be attributed to *Schistosoma hematobium* or certain medications.

4- Hemorrhagic cystitis can occur as a result of radiotherapy or chemotherapy.

Laboratory diagnosis:

1-Specimen collection : based on the collection of clean catch urine specimen ( midstream urine sample[MSU]) to bypass contamination by fecal flora. Other specimens such as supra-pubic aspiration or catheterization in children may be used .Cather urine should NOT be used .

2- Microscopic examination: about 90% of patients with acute cystitis have >10 WBCs/mm3

Gram stained smear of uncentrifuged urine is more sensitive and specific. The presence of at least one organism per oil-immersion field is always indicative of infection. In addition microscopy of a urine sample can demonstrate the presence of white blood cells , parasites or other substances.

3- Chemical screening tests: Urinary dipstick test is performed for the rapid diagnosis of cystitis by the detection of nitrites that are released by bacterial metabolism and leukocyte esterase from inflammatory cells. These tests are nonspecific. .

4-Urine culture : is important to identify the causative bacteria and its antimicrobial susceptibility pattern. Quantitative culture ( >10 5/cmm) is typical of UTI. However, lower counts ( 103 or less than 105 bacteria /mm3 ) may be considered indicative of cystitis if the patient is symptomatic.

Recurrent cystitis ( 3 or more episodes per year) requires further investigations such as ; radiological investigations such as intravenous Urogram ( IVU) , ultrasound or CT scan to detect any obstruction or congenital deformity in children. In some cases Cystoscopy is required.

 Treatment : empiric treatment is common and depends on the knowledge of local susceptibility pattern of the most common causative bacteria. Treatment is best guided by the susceptibility pattern of the causative bacteria. Antimicrobial agents commonly used are : Ampicillin ,Cephradine, Ciprofloxacin , Norfloxacin , Gentamicin & TRM-SMX .

Duration of treatment: is 3 days for uncomplicated cases. However, for complicated or recurrent cases 10-14 days is recommended.

 Preventive measures include; drinking plenty of fluids and prophylactic antibiotics ( nitrofurantoin ,TRM-SMX ).

Main concepts of the lecture

Cystitis is acute infection of the urinary bladder common in women. Bacteria are commonest cause of cystitis . *E.coli* is the commonest bacterial cause . Among gram positive bacteria; *E.faecalis* , group *B Streptococcus* and *Staphylococcus saprophyticus*. Venereal disease can present as cystitis as well. Risk factors include bladder stone ,urethral obstruction ,catheterization and diabetes mellitus.

 Pathogenesis is due to irritation of the mucosa of the urethra and bladder and ascending infection. Toxins produced by uropathogens have pathogenic role as well.

Symptoms are acute including dysuria, frequency, urgency ,pain at pubic area and may be hematuria.

Lab diagnosis depends on collecting MSU sample, microscopic ,biochemical testing and quantitative culture. Quantitative culture ( >10 5/cmm) is typical of UTI. However, lower counts ( 103 or less than 105 bacteria /mm3 ) may be considered indicative of cystitis if the patient is symptomatic. Supra-pubic aspiration may be required to get urine sample from children. Cather urine is should not be used for lab diagnosis of cystitis.

Recurrent cases require radiological investigation by IVU , ultrasound or CT scan.

Treatment : empiric treatment for 3 days for primary uncomplicated cases depending on the knowledge of local susceptibility pattern of the most common causative bacteria. Common antimicrobial agents used are : Ampicillin ,Cephradine, Ciprofloxacin , Norfloxacin , Gentamicin & TRM-SMX . For complicated and recurrent cases 10-14 days is recommended.

Prevention of cystitis include; drinking plenty of fluids and prophylactic antibiotics ( nitrofurantoin ,TRM-SMX ).

Conclusion:

Cystitis is acute urinary bladder infection commonly caused by *E.coli*. Other organisms and venereal diseases can present with cystitis. Patients present with dysuria ,frequency ,urgency ,pubic pain and many be hematuria. Risk factors for cystitis include bladder stone, urethral stricture, catheterization and diabetes mellitus. MSD is required for lab diagnosis ( chemical ,microscopic and qualitative culture) . Supra-pubic aspiration from children may be required. Treatment is empirical for 3 days for uncomplicated cases , while complicated cases require radiological investigation or cystoscopy and 10-14 days treatment depending on the results of antimicrobial susceptibility testing .Prevention is advised by using prophylactic antimicrobial agent and drinking plenty of fluids.

Take home messages:

1-Cystitis is commonly caused by bacteria.

2- Cystitis is common in women particularly during reproductive age , pregnancy and menopause.

3- Common symptoms are: dysuria, frequency and urgency .

4-Cystitis in men is due to recurrent infection of the prostate.

5- *E.coli* is the most common cause of cystitis. Among gram positive bacteria; *Enterococcus faecalis* and group *B Streptococcus* are common causes. *Candida* species is common among diabetics and catheterized patients on antibiotics.

6- Venereal diseases can present as cystitis.

7- Cystitis can be caused by non-infectious causes.

8- Laboratory diagnosis is through examination of midstream urine specimen by microscopy , chemical screening tests and quantitative culture.

9- Treatment of cystitis by antimicrobial agents according to the causative organisms .

10- Prevention of cystitis includes; drinking plenty of fluids and prophylactic antibiotics.

Further reading :

*Sherris Medical Microbiology* ,An Introduction to Infectious Diseases. Latest edition.

Authors: Kenneth Ryan, C.G.Ray. Chapter 66. Publisher: Mc Graw Hill.