

Nosocomial Urinary Tract Infections

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Received date: Nov 14, 2016; Accepted date: Feb 06, 2017; Published date: Feb 13, 2017

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Citation: Deepthi B, Gopika KT, Samyuktha KR, et al. Nosocomial Urinary Tract Infections. Skin Dis Skin Care. 2017, 2:1.

Abstract

About 40% of Nosocomial acquired infections are urinary tract infections. About two third cases the origin of microorganism is endogenous but sometimes from the moist environment of the hospitals. Nosocomial UTI's develop when indwelling urinary catheter is contaminated with microorganisms. So the catheters impregnated with antibiotics are beneficial.

The risk of NUTI's are reduced when the following guidelines are followed which means washing the hands with sanitizer, using sterile gloves, isolation of infected patients. Pathogens causing Nosocomial UTIs are having higher antibiotic resistance than pathogens causing uncomplicated UTI's. Initially standard regimen is given to treat the UTI's if it is not treated than the urine sample is sent to the lab to identify the causative organism. The antibiotic treatment depends on patient status whether she is pregnant or not, age, severity of disease. Various factors are also contributed to disease such as host, environmental, microbial factors.

Keywords: Urinary tract infections; Prostatitis; urethritis; Epididymitis

Introduction

Infections to the urinary tract leads to the development of a wide variety of clinical syndromes include urethritis, [1] cystitis, prostatitis, pyelonephritis. Lower tract infections include major infections such as urethritis (urethra), cystitis (bladder), epididymitis and prostatitis (prostate gland) and. Upper tract infections involve the kidney and are referred to as pyelonephritis.

Uncomplicated UTI's are not associated with structural or neurologic abnormalities but complicated UTI's [2-8] is the result of predisposing lesion of the urinary tract due to congenital abnormality, stone, indwelling catheter, prostatic hypertrophy, obstruction, neurologic deficit. Both uncomplicated, complicated UTI's may interfere with the

normal flow of urine or the voiding mechanism. Recurrent UTI's means two or more UTI's occurring within 6 months or three or more within 1 year. Recurrent infections are due to reinfection or relapse. Reinfections are caused by different organisms but relapse is due to single organism.

Aetiology

Less than 50% of nosocomial urinary tract infections are caused by *Escherichia coli* but it causes more than 80-90% of community acquired infections. After *E. coli* [9-15] *Enterococci* is the organism that causes frequent nosocomial urinary tract infections Age, diabetes, spinal cord injury, and catheterization are the host factors that complicate UTI's.

Enterobacteriaceae is the species that causes uncomplicated UTI in children. *Klebsiella*, *Group B streptococci*, *Enterococci* are the species that causes UTI in diabetes patients. Organism responsible for causing UTI in the people with diabetes and spinal cord injury is *E. coli*. Mostly UTI's are caused by the single organism but the multiple organisms are responsible in patients with stones, indwelling urinary catheters, chronic renal abscesses.

Epidemiology

In the United States, more than 7 million people are effected with UTI. Urinary tract infections are most commonly occur in adults but most serious in children (especially in younger children). Besides bed wetting UTI's is the most common urinary tract problem in children. After respiratory, UTI's is the most common type of infection. UTI's infections are most commonly seen in the women than in men due to their structural difference (women have shorter urethra than males). During their life time about 40% and 12% of women and men respectively have a urinary tract infection.

Pathophysiology

Three possible routes by which organisms might reach urinary tract are ascending route (Frequent route), blood borne route, and Lymphatic route. In women, UTI is preceded by colonisation of the vagina, perineum and periurethral area

by the pathogen which then ascends into the bladder via urethra.

Important factors in explaining the predominance of UTI's in females are shorter urethra than man and urethral meatus is close to the anus. During sexual intercourse, the bacterium is forced into the female urinary bladder and this risk is increased by using diaphragms and spermicides.

Diagnosis

Urine analysis is done in order to identify the signs of infection, such as the presence of white blood cells and bacteria. For identifying the type of bacteria small amount of urine is taken and is cultured. To select the specific antibiotic these bacteria is treated with different antibiotics. For culturing, mid-stream urine is necessary which prevents the contamination with bacteria. If it is not possible a catheter is placed in the urethra in order to drain the urine from the bladder. After the process is completed catheter is removed unless the patient is ill.

Sexually active women will require pelvic examination and males require genital examination because the females suffering with pelvic infection have the similar type of symptoms like that of UTI and the males suffering with prostate infection require longer duration of antibiotics. Imaging test are most often used in children and adults with recurrent urinary tract infections and the people who have anatomic abnormality and the people with blood in their urine.

Kidney and bladder problems are evaluated by ultrasonic examination. Physical abnormalities are detected by fluoroscopic studies. A contrast dye is used in the Intravenous Pyelogram (IVP) in order to highlight the urinary tract abnormalities. Detection of abnormalities inside the bladder which contribute to infections is detected by cystoscopy which consists of a thin flexible tube with a camera on its end. Complete picture of the three-dimensional urinary tract is given by CT scan.

Treatment

Nonspecific treatment

By drinking a lot of fluids most of the infected urine is removed by frequent bladder emptying.

Specific treatment

First choice for the treatment of treatment for all UTIs is antibiotics. A variety of antibiotics are available, and choices depends mainly on different factors, including even the infection is complicated or uncomplicated or recurrent primary or treatment decisions are also based on the type of patient (man or woman, a non pregnant woman or a pregnant, child, hospitalized or as well as non-hospitalized patient, people with diabetes). Treatment should not necessarily be based on the actual bacteria count. For example, if a woman has these

symptoms, even if the bacterial count is nil or normal, infection is almost present, and the doctor should consider antibiotic treatment.

Treatment for uncomplicated UTIs

Antibiotic regimen: The antibiotics that are commonly used to treat uncomplicated UTIs are

- TMP-SMX (Bactrim, Cotrim, Septra) is the standard prescribed drug, It is a combination of antibiotic (trimethoprim) with a sulfa drug (sulfamethoxazole). Most commonly 3 days regimen is used. Allergies to sulfa are common and may be serious.
- Due to the development of high resistance to TMP-SMX now a day's quinolones are the first line choice for the treatment of UTIs. Ciprofloxacin (Cipro) is the most commonly used quinolone antibiotic. Quinolones are usually given over a 3-day period. Contraindicated in pregnant women.
- Third option is Nitrofurantoin (Furadantin, Macrochantin) and the drug must be given for longer than 3 days.
- In pregnancy Fosfomycin (Monurol) is safe but is not as effective as other antibiotics.
- Other antibiotics used are amoxicillin (with or without clavulanate) cephalosporins, doxycycline .But the doxycycline is not given to children or pregnant women.
- If the infection is not treated within a week after the antibiotic therapy [16-22] than the urine sample is cultured to identify the specific type of organism in order to select specific antibiotic.

Treatment for relapsing infection

Due to the treatment failure a relapsing infection occurs within 3 weeks in about 10% of women. Same antibiotics are used as initial infection but the course is continued for 7-14 days. Relapsing infections also may be due to structural abnormalities or abscesses.

Treatment for recurrent infections

Women who have two or more symptomatic UTI's within six months or 3 or more over the course of annum may particularly need preventive antibiotics

Intermittent self treatment: If the infections (initial attack) occur less than twice a year are usually self-treated with single dose or three day antibiotic regimen A woman should consult a doctor under the following conditions if symptoms are not gone away within 48 h or if she is a pregnant if she have more than four infections a year or the patient with impaired immune systems, previous kidney infections, structural abnormalities of the urinary tract, or a history of infection with antibiotic-resistant bacteria.

Post coital antibiotics: If recurrent infections are due to the sexual intercourse a single preventive dose of TMP-SMX or nitrofurantoin or cephalexin or fluoroquinolone (such as

ciprofloxacin) is given after sexual intercourse. (Fluoroquinolones contraindicated in pregnancy.)

Continuous preventive antibiotics (Prophylaxis): Low-dose antibiotics are taken continuously for 6 months or longer.

Treatment for kidney infections (Pyelonephritis)

The presentation of high grade fever (>38°C [100.9°F]) and severe flank pain should be treated as acute pyelonephritis. Fluoroquinolones (ciprofloxacin or levofloxacin) orally for 7-10 days are the first line choice in mild to moderate pyelonephritis. TMP-SMX for 14 days ampicillin is used against *Streptococcus faecalis*. In seriously ill patient the initial therapy is an IV fluoroquinolone, aminoglycoside with or without ampicillin or an extended spectrum cephalosporin with or without aminoglycoside.

Treatments for specific populations

Treating pregnant women: Pregnant women are at high risk for UTIs and their complications. The safe antibiotics used during pregnancy are cephalexin, amoxicillin, or moxycillin/clavulanate administered for 7 days. Tetracyclines should be avoided because of teratogenic effect and the sulfonamides should not be administered because of the development of kernicterus and hyperbilirubinemia. Fluoroquinolones also contraindicated because they inhibit the cartilage and bone development in the new born.

Treating children with UTI's: Cephalexin (Keflex) TMP-SMX, other cephalosporins, amoxicillin/clavulanic acid (Augmentin), amoxicillin, or all are used to treat UTIs in children. These drugs are taken either in liquid or in pill form by mouth or doctors sometimes give them as a shot or IV. Vesicoureteral reflux (VUR) is a concern for children with UTI's. VUR can lead to kidney infection (pyelonephritis), which can cause kidney damage. VUR require long-term antibiotics to prevent infections or surgery to correct the condition.

Conclusion

Urinary tract infection is most commonly occurring in women than men due to their anatomical difference such as their length of the urethra in females is shorter than in males. In addition, age is a major factor where elderly people with urinary devices like catheters are usually prone to the infection. Though antibiotic usage has proven to be beneficial in counteracting the infection.

References

- Saleem K, Azim W (2016) Patterns of Presentation in Gonococcal Urethritis and Assessment of Antibiotic Sensitivity in Gonorrhoea. J AIDS Clin Res 7: 613.
- Yong TY, Khoo KSF (2016) Urinary Tract Infections in Older People with Long-Term Indwelling Catheters. J Emerg Infect Dis 1: e002.
- Urrutia-Herrera D, Greiner F, Tejada-Tayabas LM, Monárrez-Espino J (2016) Clinical Training of Primary Health Care Physicians to Reduce False Positive Diagnoses of Pediatric Urinary Tract Infections. J Comm Med Health 6: 412.
- Litster A (2007) Prevalence of bacterial species in cats with clinical signs of lower urinary tract disease: recognition of *Staphylococcus felis* as a possible feline urinary tract pathogen. Vet Microbiol 121: 182-188.
- Hasman H (2005) Beta-Lactamases among extended-spectrum beta-lactamase (ESBL)-resistant *Salmonella* from poultry, poultry products and human patients in the Netherlands. J Antimicrob Chemother 56: 115-121.
- Gibson JS (2010) Characterization of multidrug-resistant *Escherichia coli* isolated from extraintestinal clinical infections in animals. J Med Microbiol 59: 592-598.
- Luo Y, Ma Y, Zhao Q, Wang L, Guo L, et al. (2012) Similarity and divergence of phylogenies, antimicrobial susceptibilities, and virulence factor profiles of *Escherichia coli* isolates causing recurrent urinary tract infections that persist or result from reinfection. J Clin Microbiol 50: 4002-4007.
- Bjerklund Johansen TE, Cek M, Naber K, Stratchounski L, Svendsen MV, et al. (2007) Prevalence of hospital-acquired urinary tract infections in urology departments. Eur Urol 51: 1100-1111.
- Agboola A (2004) Infertility and Subinfertility. In: Akin A (ed.) Textbook of Obstetrics and Gynaecology (Ibadan Heinman Educational Books 1: 174-176.
- Hellani A, Al-Hassan S, Iqbal MA (2006) Y chromosome microdeletions in infertile men with idiopathic oligo- or azoospermia. J Exp Clin Assist Reprod 3: 1.
- Ouzounova-Raykova V, Ouzounoval, Mitov I (2009) Chlamydia trachomatis infection as a problem among male partners of infertile couples. Andrologia 41: 14.
- Golshani M, Taheri S, Eslami G, SuleimaniRahbar AA, Fallah F, et al. (2006) Genital tract infection in asymptomatic infertile men and its effect on semen quality. Iran J Public Health.
- Pellati D, Mylonakis I, Bertoloni G, Fiore C, Andrisani A, et al. (2008) Genital tract infections and infertility. Eur J Obstet Gynecol Reprod Biol 140: 3.
- Centers for Disease Control (CDC) (2005) Enterotoxigenic *Escherichia coli* (ETEC).
- Centers for Disease Control (CDC) (2014) *Pseudomonas aeruginosa* in healthcare settings.
- Rojas L, Bunsow E, Muñoz P, Cercenado E, Rodríguez-Crèixems M, et al. (2012) Vancomycin MICs do not predict the outcome of methicillin-resistant taphylococcus aureus bloodstream infections in correctly treated patients. J Antimicrob Chemother 67: 1760-1768.
- Kollef MH, Guillet CV (2015) If antibiotics did not exist. Intensive Care Med 41: 525-527.
- Weston A, Boucher HW (2012) Daptomycin for methicillin-resistant *Staphylococcus aureus* bloodstream infection and elevated vancomycin minimum inhibitory concentrations: has the time come? Clin Infect Dis 54: 59-61.
- Rubin BK (2008) Aerosolized antibiotics for non-cystic fibrosis bronchiectasis. J Aerosol Med Pulm Drug Deliv 21: 71-76.

20. Stass H, Nagelschmitz J, Willmann S, Delesen H, Gupta A, et al. (2013) Inhalation of a dry powder ciprofloxacin formulation in healthy subjects: a phase I study. *Clin Drug Investig* 33: 419-427.
21. Ohara E, Kitadai Y, Onoyama M, Ohnishi M, Shinagawa K, et al. (2012) Regression of rectal MALT lymphoma after antibiotic treatment in a patient negative for *Helicobacter pylori*. *Clin J Gastroenterol* 5: 59-63.
22. Volz KA, Canham L, Kaplan E, Sanchez LD, Shapiro NI, et al. (2013) Identifying patients with cellulitis who are likely to require inpatient admission after a stay in an ED observation unit. *Am J Emerg Med* 31: 360-364.