Uncomplicated urinary tract infection

Abstract

Urinary tract infection is considered to be one of the most common infectious diseases in the world. Its pathology is divided into complex urinary tract infection and non complex urinary tract infection. The latter is very common in primary treatment, and its clinical manifestations can be non complex cystitis or non complex pyelonephritis. Uncomplicated urinary tract infections occur in healthy people without a history of functional abnormalities. It mainly affects young women. *E.* Coli is the most common infectious microorganism. The diagnosis is based on clinical conditions and usually does not need laboratory examination. The management will depend on the etiology.

Key words: Urinary tract infection Escherichia *coli; β* - lactamase; Cystitis; Pyelonephritis.

Introduction

The urinary tract is usually extended, except for the farthest end of the urethra (1). Urinary tract infection (UTI) is a common clinical disease, which has gradually decreased due to appropriate and timely treatment in recent years (2). There are many classifications, the most commonly used is the complex and non complex UTI classification, which is the infection affecting healthy individuals with normal structure and complete defense mechanism. This type of UTI is the most common in the world, and about 50-60% of adult women will have UTI at least once in their life. This infection includes a variety of clinical manifestations, depending on the location and etiology of the infection, and may be manifested as non complex aguna cystitis or non complex pyelonephritis. Therefore, it is very important to evaluate the environment in which the infection occurs and the type of patients affected (3). The importance of this topic is that this type of UTI ranks second (3,4) in the infection treated by family medicine. Its prevalence is very high and affects the quality of life of patients. Therefore, this paper will focus on the non complex UTI of adult women, focusing on clinical and treatment.

Method

This paper reviews 38 different literature sources and uses 21. The main sources of information and consultation are pubmed, Elsevier, family and community care books, and the family medicine association. The articles selected were mainly research papers, treatment guidelines and clinical cases, required topics, treatment, diagnosis, uncomplicated infection, and community prevalence studies based on gender and age. All articles and books used for reference are relevant and highly scientific. Due to the high possibility of potential anatomical or functional changes in male ITU, they were included in the complex infection group. Therefore, male ITU articles, pediatric ITU based articles and studies without scientific basis or support were excluded.

Definition

- **Uncomplicated urinary tract** infections: they have micturition symptoms, usually without fever (3), which may be acute, sporadic or recurrent. They are limited to premenopausal women who are not pregnant, and there are no comorbidities with anatomical, functional abnormalities or complete defense mechanisms. Uncomplicated utis may be upper urinary tract infections, including uncomplicated pyelonephritis or lower urinary tract infections, including uncomplicated cystitis (4).
- **Combined** urinary tract infection: some authors believe that men, pregnant women, children under the age of 5, people with low immune function, patients with diabetes, patients with renal insufficiency or clinical duration of more than one week or repeated infection, and patients who have undergone urological surgery (3.5). See **Table 1.**

Table 1. Definition of complex and non complex urinary tract infections

Type of	Features	Risk
Not complicated	● Healthy young woman ● Not pregnant ● Symptoms < 7 days	The risk of pyelonephritis and treatment failure is minimal
Complex	Patients with normal urinary tract: ● Diabetes ● Immune damage ● Urinary operation ● Ninos ● Aged ● Male ● Resident ● Symptoms > 7 days	Risk of pyelonephritis, treatment failure and sepsis

Urinary tract abnormalities: ● Obstacle ● Vesicoureteral reflux ● Neurogenic bladder ● Calculus ● Pregnant	

Source: Juan Pablo hokajada, Daniel Garcia Palomo, Carmen Farinas. Treatment of uncomplicated lower urinary tract infection Journal - disease - infection - Microbiology - clinical [Internet]. 2005 [refer to December 2, 2019]; 23(S4):22-27

- **Uncomplicated cystitis: it** is a low urinary tract infection and the second group of important out of hospital infections (second only to respiratory tract infections).
- **Uncomplicated pyelonephritis: This is** a high urinary tract infection, usually the result of ascending infection of the lower urinary tract.

Epidemiology

These infections are a burden on public health. About 50-60% of adult women will have UTI at least once in their life (3), and 25% will relapse (4.6). The overall incidence rate for men and women is 3%, and the annual incidence rate for women is 6% (3). Its incidence increases with age, comorbidity and Institutionalization (5). In the United States, the incidence of acute cystitis is 7 million times a year, and each attack results in a loss of 1.2 working days (7 days). Table **2.** Depending on age and gender, it exposed the most common ITU.

Table 2. Age and sex of the most common urinary tract infections

Patient	Infection rate
Nino	Asymptomatic pyelonephritis / bacteriuria
Nina.	Bacterial urine Asymptomatic / pyelonephritis
Man	Urethritis / prostatitis
Woman	Acute recurrent cystitis
Gravid	Asymptomatic bacteriuria / acute cystitis
The elderly	Asymptomatic bacteriuria / iatrogenic infection
Old lady	Asymptomatic cystitis / bacterial urine

Source: F. Bouytrago Ramirez, J.I. Calvo hueros. Kidney disease. Yeah. Martin zurro, J.F. Cano Perez, J. Gene baadia primary care issues in family medicine counseling. Seventh edition. Barcelona. Spain. Elsevier; 2014, No. 529-530

Etiology

It is called a group of microorganisms, such as "urinary pathogens", which can surpass or minimize the host's defense mechanism. The microorganisms isolated vary depending on the patient's condition (8). The most important *pathogen* is Escherichia coli, which causes 70% to 95% of UTI (9) in the community, and the rest *are saprophytic Staphylococcus, Proteus* mirabilis, Streptococcus *agalactiae* and Klebsiella. Most urinary pathogens come from the intestinal flora itself.

Broad spectrum β - lactamase (Blee) is a plasmid mediated enzyme with the ability to hydrolyze penicillin, oxime cephalosporin, broad spectrum cephalosporin and aztreonam.

In addition, Blee producing organisms may develop cross resistance to other commonly used antibiotics (10-13). The outbreak of Klebsiella pneumoniae and TEM was mainly related to the outbreak of Klebsiella pneumoniae in hospitals all over the world in *the* 1990s. However, since 2000, ctx-m enzyme has become a common Blee, and Escherichia *coli* producing ctx-m has become an important urinary tract pathogen. Molecular epidemiological studies show that this mutation is mainly caused by a clone (ST131), and travel abroad is mainly in high-risk areas such as India, which may play an important role in the transmission of this clone (14,15).

The American Academy of infectious diseases (IDSA) recommends that doctors obtain information on local drug resistance rates and conduct regular monitoring studies to monitor the changes in antibiotic sensitivity of urinary tract pathogens (16-18).

Risk factors

The possible reasons for increasing ITU risk are (19,20):

- Previous urinary tract infection.
- Sexual activity, especially with a new sexual partner
- Changes in vaginal flora or acidity caused by menopause or the use of spermicide.
- Pregnant.

- Age (elderly).
- Sedentary (immobile)
- Catheterization
- Renal calculus.

Classification

There are different ITU classification systems. In 2011, CDC, IDSA, ESCMID and FDA proposed the most commonly used classification. According to the clinical manifestations of urinary tract infection, the anatomical level of urinary tract infection, the severity of infection, the classification of risk factors and the availability of appropriate antibacterial treatment, the Department of urinary tract infection of the European Association of Urology (EAU) proposed orenuc classification system (8). Currently, non complex and complex ITU concepts are used (21).

Clinic

Cystitis is characterized by sudden dysuria, frequent urination, urgency, frequent urination, urinary incontinence, ankylosis and less suprapubic pain (2). It may be recurrent and should be distinguished between recurrence and reinfection. Recurrence is the same microorganism in the urinary tract after continuous treatment. Urinary tract infection, that is, the same bacteria as the previous infection were detected, usually occurred 2 weeks before the completion of pretreatment. Reinfection is an infection unrelated to the previous infection, which occurs one month after the end of treatment. It is usually produced by different bacteria, although the same bacteria are not uncommon (19).

In uncomplicated pyelonephritis, symptoms usually appear in the first 24 hours, manifested in varying degrees of lumbar pain, discomfort, chills and fever. May be accompanied by dysuria, nausea and vomiting. Punching and kicking in the renal fossa is painful, usually unilateral, and sometimes tenderness in the lower abdomen, because persistent cystitis occurs in the front. Laboratory tests include leukocytosis and left deviation, pyuria, sometimes accompanied by leukocytosis, and hematuria. For acute pyelonephritis, urine culture and blood culture should be carried out.

Diagnostic

In most cases, only targeted, well structured and complete memory is required (6). The use of urine examination and urine culture should be reasonable and should be used only when strictly necessary.

Asymptomatic bacteriuria should not be sought or treated, in part because it contributes to the development of drug-resistant bacteria (1).

Table 3. Diagnosis method of non complex ITU

Initial clinical table	Patient characteristics	Diagnosis and treatment considerations
● Acute attack ● Dysuria ● Polish urine ● Urgent urination	Healthy women, no obvious history of pregnancy	Consider the presence of uncomplicated cystitis. No urine culture is required
	Women with uncertain history of communicable diseases or risk factors	Consider the presence of uncomplicated cystitis or sexually transmitted diseases. Use colorimetric bars, urinalysis and culture. Sexually transmitted diseases, gynecological examination
● Acute attack ● Backache ● Nausea and vomiting ● Have a fever ● Cystitis symptoms	Healthy female, not pregnant	Consider uncomplicated pyelonephritis Urine culture Consider out of hospital treatment

Source: Karpan Gupta, Barbara w. Tratner. Harrison principles of Internal Medicine 19 amps. United States of America. Mount mcgraw education; Urinary tract infection, pyelonephritis and prostatitis. 2016。861p

It should be noted that treatment is usually based on memory. If memory is unclear, urine test paper colorimetry can be carried out. Table **3.** The diagnostic method of a case of uncomplicated ITU is summarized.

Treatment

For uncomplicated ITU, single dose or 3-day empirical treatment can be used, which is considered to be short-term, and there is evidence that short-term empirical treatment is desirable (19).

You can have short-term (3-day) experiential therapy with one of the following options:

- Trimethotropine sulfamethoxazole (TMP-SMX) 2 tablets every 12 hours
- Quinolones:
  - Norfloxacin: 400 mg / 12 hours

- Ciprofloxacin: 500 mg / 12 hours
- Ofloxacin 200mg / 12h

You can use one of the following options for single dose empirical treatment:

- Compound sulfamethoxazole: 400 mg trimethoprim + 2 g sulfamethoxazole (5 tablets). Trimethoprim: 400 mg
- Ampicillin: 3 G

For uncomplicated cystitis, guidelines published by the American Society of infectious diseases recommend the use of TMP-SMX as the drug of choice (2). Among the drugs used to treat ITU, the drugs that have the least impact on fecal flora are pimycin, fosfomycin and furantoin, while quinolones, TMP-SMX and ampicillin have an impact on intestinal flora. The best study drugs include TMP-SMX and nitrofurantoin. The recommended dose is:

- Nitrofurantoin 100mg C / 12h, lasting for 5-7 days. The common side effects are nausea and headache.
- TMP-SMX is a complex dual power C / 12 for 3 days. The most common are rash, urticaria, nausea, vomiting and blood abnormalities

The second and third generation cephalosporins maintain high sensitivity, but the high recurrence rate associated with the use of cephalosporins and the emergence of Enterobacteriaceae producing broad-spectrum β - lactamases in the community should be taken into account. The eradication effect of amoxicillin clavulanic acid was lower than that of quinolones. The drug resistance rate of fosfomycin tromethamine remained below 2%, and its efficacy and safety were proved in a single dose (3).

For uncomplicated pyelonephritis, the purpose of treatment is to eradicate pathogenic microorganisms in a short time. There is evidence that there are a *large* number *of* TMP-SMX resistant E. Coli in patients with uncomplicated pyelonephritis, and fluoroquinolones are the first choice. There is evidence that ciprofloxacin 500mg twice a day, with an initial dose of 400mg, intravenous or no intravenous injection for 7 days, is effective as the initial treatment. In addition, TMP-SMX dual power supply is recommended, twice a day for 14 days (as long as it is not durable) (2).

Different countries have different drug resistance to antibiotics; Therefore, appropriate treatment methods should be selected to reduce the risk of drug-resistant strains and potential treatment failure. The duration of treatment will depend on different clinical manifestations, and excessive or insufficient treatment days should be avoided (1).

In recent years, efforts have been made to integrate antimicrobial management programs into health care, aimed at optimizing clinical outcomes, ensuring cost-effective treatment and minimizing the adverse consequences of antimicrobial use, Therefore, a Cochrane review of the effectiveness of these programs to improve inpatient antibiotic prescribing practices updated in 2017 found highly established evidence that these interventions effectively improved antibiotic policy compliance, thereby reducing treatment time and hospital stay, This review found no evidence that reducing antibiotic use increases mortality (10).

The antimicrobial management plan should include the following important components (11):

- Train staff in the proper use of antimicrobial agents and comply with local, national or international protocols.
- Visit and consult infection doctors and clinical microbiologists regularly.
- Compliance audit and treatment results.
- Regularly monitor and feed back the performance of prescription doctors and local drug resistance to pathogens.

Conclusion

Uncomplicated UTI is one of the most common problems in our environment. It represents a high prevalence of clinical problems, a common pathology in the health system, and a considerable incidence and medical costs. Uncomplicated acute cystitis or pyelonephritis should be considered in adult patients who are not pregnant or elderly, have no recent history of instrumentation, and have no functional or anatomical abnormalities of the urogenital tract. Most of these infections are caused by *E.* Coli. *For* uncomplicated UTI, the diagnosis is carried out through complete medical history and physical examination, and there is no need for laboratory examination or imaging examination. According to the clinical history of primary care doctors, the risk factors of patient exposure should be determined in order to identify patients and take a comprehensive approach, not only through treatment, but also through preventive conversation. It is recommended to start short-term experience treatment (3 days). It is important to know whether microbial resistance exists in our community, because the use of antibiotics will depend on it. There is evidence that the development of programs emphasizes the continuous supervision and training of

health personnel, optimizes clinical results and ensures effective and efficient treatment, which is why this review recommends the development of personalized programs for each community to improve the cost-effectiveness of treatment. In Latin America, more research is needed to develop strategies to prevent uncomplicated ITU.

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