



URINARY TRACT INFECTIONS IN CHILDREN: THEORETICAL AND CLINICAL APPROACH

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Abstract: This article presents data on the etiology, classification, clinical manifestations, diagnostic criteria, and treatment strategies of urinary tract infections (UTIs) in children. Special attention is paid to the fact that in infants under 3 months of age, UTIs may often present without specific clinical symptoms. The article discusses the criteria for selecting antibiotic therapy, approaches to treatment in both outpatient and inpatient settings, as well as diagnostic algorithms based on theoretical sources and clinical guidelines.

Keywords: urinary tract infection, child, pyelonephritis, cystitis, antibiotic therapy, diagnosis

Introduction

Urinary tract infections (UTIs) are among the most common pathological conditions in children, particularly in those under the age of five. They can lead to renal parenchymal damage, chronic pyelonephritis, and, eventually, kidney failure. In many cases, the absence of specific symptoms causes delays or errors in diagnosis. Therefore, early identification of UTIs, proper differential diagnosis, and the development of adequate treatment strategies are essential for optimal pediatric care.

Literature Review and Etiopathogenesis

The majority of UTIs in children are caused by *Escherichia coli*. Other pathogens include *Klebsiella*, *Proteus*, and *Enterococcus* species. Infection may ascend from the urethra or descend from systemic circulation. In girls, due to the shorter length of the urethra, bacteria can ascend more easily to the bladder and kidneys. During the neonatal period, immature immune responses, congenital urinary tract anomalies, and inadequate hygiene practices significantly increase the

risk of developing UTIs.

Clinical Manifestations

The clinical presentation of UTIs in children varies with age. In infants under three months, symptoms are often nonspecific and include fever of unknown origin, poor feeding, vomiting, lethargy, irritability, or persistent crying. In some cases, hypothermia, jaundice, diarrhea, or sepsis-like symptoms may develop.

In older children (especially over the age of two), symptoms are more specific and localized to the urinary tract. These include dysuria, urinary frequency, urgency, suprapubic discomfort, and flank or costovertebral angle tenderness (in cases of pyelonephritis). Hematuria or pyuria may also be observed. Changes in urine odor and color, enuresis, loss of appetite, nausea, and vomiting are common general signs of intoxication. Because of these variable symptoms, pediatricians should consider UTI in all febrile children, especially when no obvious source of fever is identified.

Diagnosis and Laboratory Investigations

In addition to clinical signs, laboratory and imaging tests are essential for diagnosing UTIs in children. The initial evaluation includes a urinalysis, which may show leukocyturia (an elevated white blood cell count) and bacteriuria. These are key screening markers in both symptomatic and asymptomatic cases.

The nitrite test helps detect gram-negative bacteria, primarily *E. coli*, which convert urinary nitrate to nitrite.

The urine culture is the gold standard for diagnosis and guides antibiotic therapy. In this test, the urine sample is incubated on growth media to identify pathogens and determine their antibiotic susceptibility. This is especially crucial in recurrent or complicated infections.

Blood tests, such as white blood cell count, C-reactive protein (CRP), and serum creatinine, are used to assess systemic inflammation and renal function.

Ultrasonography of the abdomen and urinary tract is recommended to detect congenital or acquired anatomical abnormalities, including hydronephrosis and vesicoureteral reflux. Accurate diagnosis is essential for preventing complications and recurrence.

Treatment Approaches

The management of UTIs in children depends on the severity of infection, age, and the child's overall clinical status. The primary goals are to eliminate the infection, relieve symptoms, and prevent long-term renal damage. Treatment can be provided on an outpatient or inpatient basis.

Outpatient Management

Uncomplicated UTIs, especially simple cystitis, may be managed on an outpatient basis if the child is clinically stable. Commonly used first-line antibiotics include nitrofurantoin and co-trimoxazole (trimethoprim-sulfamethoxazole). The treatment duration is typically 7–10 days, though shorter 3–5-day regimens may be effective in some cases.

Children should be encouraged to increase fluid intake, especially water, to promote urinary flow and assist in mechanical clearance of bacteria from the urinary tract. Proper hygiene practices and regular voiding schedules should be reinforced.

Inpatient Management

Hospitalization is indicated for infants under three months, immunocompromised children, or those with severe pyelonephritis. In such cases, parenteral antibiotic therapy is required. Common empirical antibiotics include cefotaxime (a third-generation cephalosporin) and gentamicin (an aminoglycoside). Treatment is adjusted based on urine culture results.

During inpatient care, body temperature, general condition, and signs of intoxication are closely monitored. Parenteral fluid therapy is initiated in cases of vomiting or dehydration. **Renal function** parameters such as serum creatinine and urine output are also tracked. Once the child's condition stabilizes, the antibiotic course can be completed orally at home.

Proper antibiotic selection and timely initiation of therapy accelerate recovery, reduce the risk of complications, and prevent the development of chronic pyelonephritis or renal insufficiency.

Conclusion

Urinary tract infections are common in children but may lead to serious complications if not promptly and accurately diagnosed. Early recognition, appropriate treatment strategies, and preventive measures are essential to mitigate nephrological risks associated with pediatric UTIs. Pediatricians should follow up-to-date clinical guidelines to ensure effective and safe care.

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