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# Tuberculous Cystitis in a Pediatric Patient with Hematuria

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## Description

Tuberculous cystitis is a rare but important manifestation of Genitourinary Tuberculosis (GUTB), especially in pediatric patients. Tuberculosis (TB) remains a global health challenge, with millions affected annually, and although pulmonary TB is the most common form, extrapulmonary TB accounts for a significant proportion of cases. Among the extrapulmonary presentations, genitourinary tuberculosis represents about 10%-15% of cases in adults but is less commonly reported in children. Tuberculous cystitis specifically refers to the involvement of the urinary bladder by Mycobacterium tuberculosis infection, leading to chronic inflammation, fibrosis, and characteristic clinical manifestations such as irritative voiding symptoms and hematuria. Early recognition and diagnosis of tuberculous cystitis in children presenting with hematuria is crucial to prevent long-term complications such as bladder contracture, renal damage, and infertility.

The pathogenesis of tuberculous cystitis in pediatric patients usually involves secondary spread from a primary pulmonary focus, which may be active or latent. The bacilli typically reach the genitourinary tract hematogenously or via lymphatic dissemination. In children, the immune response may be variable, often influenced by nutritional status and immunization history, including Bacillus Calmette-Guérin (BCG) vaccination. Tuberculous involvement of the bladder mucosa leads to granulomatous inflammation, ulceration, and caseous necrosis, which manifests clinically as chronic cystitis symptoms. The disease process may be insidious, with nonspecific symptoms leading to delayed diagnosis.

Hematuria, either microscopic or gross, is a common presenting symptom of tuberculous cystitis in children. It may be intermittent and painless or accompanied by dysuria, frequency, urgency, and suprapubic pain. These irritative voiding symptoms often mimic bacterial cystitis, leading to misdiagnosis and delayed appropriate therapy. Recurrent urinary tract infections unresponsive to conventional antibiotics should raise suspicion of a more unusual underlying etiology, such as tuberculosis, particularly in endemic regions or in children with a history of TB exposure. Constitutional symptoms like fever, weight loss, and night sweats may be absent or subtle, further complicating timely diagnosis.

The diagnostic evaluation of a pediatric patient suspected to have tuberculous cystitis begins with a thorough history and physical examination, including assessment of TB exposure and systemic signs. Urinalysis commonly reveals pyuria and hematuria, but these findings are nonspecific. Urine culture for routine bacterial pathogens is often negative. Acid-Fast Bacilli (AFB) staining and culture of urine samples for Mycobacterium tuberculosis remain the gold standard for diagnosis, although sensitivity is variable and multiple samples may be required to improve yield. Nucleic Acid Amplification Tests (NAAT) and

Polymerase Chain Reaction (PCR)-based assays have increasingly been used to enhance the rapid detection of mycobacterial DNA in urine specimens, offering higher sensitivity and faster results.

Management of tuberculous cystitis in pediatric patients requires a multidisciplinary approach involving pediatricians, infectious disease specialists, and urologists. The basis of treatment is Anti-Tubercular Therapy (ATT), which typically involves an initial intensive phase of four drugs-isoniazid, rifampicin, pyrazinamide, and ethambutol-followed by a continuation phase of isoniazid and rifampicin for a total duration of six to nine months, depending on clinical response and disease severity. Early initiation of ATT is essential to prevent progression of bladder damage and preserve renal function.

In addition to pharmacological therapy, supportive measures are important. Adequate hydration, pain management, and treatment of secondary bacterial infections should be provided. In cases with significant bladder involvement leading to decreased capacity or obstruction, surgical intervention may be necessary. Procedures such as bladder augmentation or reconstructive surgery can be considered in advanced disease to improve bladder function and quality of life. Regular follow-up with imaging and urinary studies is important to monitor response to therapy and detect complications.

Prognosis in pediatric tuberculous cystitis largely depends on the timing of diagnosis and initiation of treatment. Early disease responds well to ATT with resolution of symptoms and preservation of bladder function. Delayed diagnosis and treatment can lead to fibrosis, bladder contracture, and upper tract involvement, resulting in chronic kidney disease and long-term morbidity. Additionally, tuberculous cystitis in children is often associated with concomitant involvement of other genitourinary structures such as the kidneys, ureters, or reproductive organs, necessitating comprehensive evaluation.

## Conclusion

Tuberculous cystitis should be considered in the differential diagnosis of pediatric patients presenting with hematuria and irritative urinary symptoms, particularly in tuberculosis-endemic regions or in children with a history of exposure. The nonspecific clinical presentation requires a high index of suspicion, and diagnosis is confirmed through microbiological, histopathological, and radiological evaluation. Early initiation of anti-tubercular therapy is vital to prevent serious complications and preserve renal and bladder function. Multidisciplinary care and long-term follow-up are necessary to manage this challenging condition effectively and improve patient outcomes.