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PERSISTENT URINARY TRACT INFECTION DESPITE TARGETED ANTIBIOTICS: THE ROLE OF SURGICAL INTERVENTION IN ENCRUSTED CYSTITIS CAUSED BY *CORYNEBACTERIUM UREALYTICUM*

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ABSTRACT

Background: Corynebacterium urealyticum is a Gram positive, slow-growing bacterium that is a most commonly cause of encrusted cystitis. A major clinical problem is recurrent urinary tract infections with encrustation of the bladder mucosa especially for multimorbid individuals with weakened immune systems.

Case report: We present the case of a 75-year-old male who was admitted to the urology department with perineal and urethral pain, dysuria, and macrohematuria. His medical history included complicated benign prostatic hyperplasia, vesical and splenic calculi, chronic cystitis, recurrent complicated urinary tract infections, and multiple prior urological interventions.

Cystoscopy demonstrated nonspecific inflammation, incrustation of the bladder mucosa and prostatic area, and multiple bladder stones. Urine culture identified *Corynebacterium urealyticum*, which was susceptible to vancomycin. The patient received a 7-day course of vancomycin; however, no clinical improvement was observed.

Surgical debridement of the urethral and bladder mucosa was subsequently performed, followed by a 2-week course of vancomycin. The patient's clinical condition improved markedly after this combined approach.

Conclusion: This case highlights the importance of considering rare infectious agents in patients with recurrent urinary tract infections, particularly in those with a history of multiple hospitalizations and broad-spectrum antibiotic exposure. Infectious calculi can act as a persistent source of infection and may not respond to systemic antibiotic therapy alone. In such cases, surgical debridement of the mucosa is essential to achieve effective treatment.

KEYWORDS

Cystitis, *Corynebacterium*, urology, urinary tract infection

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LEARNING POINTS

- Elderly or multimorbid patients with recurrent or refractory urinary tract infections should be evaluated for *Corynebacterium urealyticum*, especially if they have had previous urological procedures, chronic catheterization or persistent bladder inflammation.
- Mucosal encrustation and infectious calculi function as chronic foci of infection, reducing the effectiveness of systemic antibiotic therapy alone and contributing to persistent or relapsing symptoms.
- A multimodal approach, including accurate microbiological identification, targeted antimicrobial therapy and endoscopic removal of encrustations and calculi, is needed to organize the best management of encrusted cystitis.

INTRODUCTION

Encrusted cystitis, first described in 1914, is a very rare but severe chronic inflammatory disease which often develops on already damaged urological tissue, involving an infection by urease-producing bacteria. Encrusted cystitis is most often associated with infection by *Corynebacterium urealyticum* - a Gram-positive, slow-growing, and highly antibiotic-resistant bacterium[1,2].

Although the infection typically manifests with nonspecific symptoms such as urethral discomfort, haematuria, dysuria, perineal and urethral pain, because *C. urealyticum* is multi-drug resistant, treatment can be difficult and cause complications[3]. Given these challenges, we present this case to illustrate the diagnostic and therapeutic difficulties in elderly, multimorbid patient with recurrent urinary tract infections and prior urological interventions. Our experience highlights that infectious encrustations can serve as a chronic focus, often refractory to systemic antibiotics alone, and that successful management may require endoscopic clearance via cystolithotripsy combined with culture-directed antibacterial therapy.

CASE DESCRIPTION

A 75-year-old male patient was admitted to urology department with macrohematuria, difficulty urinating and complete retention of urine. Diagnostic procedures, including computed tomography (CT) scan of the lungs and abdomen, magnetic resonance imaging (MRI) of the abdomen and pelvis, cystoscopy, urine cytology and prostate ultrasound were performed.

Treatment included an intermittent urinary catheter, trocar cystotomy and antibacterial therapy with ciprofloxacin for 5 days. The patient was discharged after 7 days with diagnoses of complicated benign prostatic hyperplasia (BPH), macrohematuria, complicated urinary tract infection and cystitis.

A month later the patient underwent planned transurethral resection of the prostate. Preoperative imaging revealed signs of chronic cystitis, vesical and splenic calculi, kidney cysts and a severely enlarged prostate (55 cm^3). Preoperative pelvic MRI showing a severely distended bladder before TURP (Fig. 1).

The patient had elevated prostate-specific antigen (PSA) levels and antibacterial therapy was administered perioperatively. The operation and postoperative period were uncomplicated.

Ten months after transurethral resection of the prostate (TURP) urodynamic examinations were performed due to complaints of a weaker urine stream. Cytometry revealed a bladder with normal compliance and capacity, and the patient was prescribed solifenacin 5 mg once a day per oss.

Just 2 months later the patient developed for dysuria and urethral pain. A complicated urinary tract infection was diagnosed, and urine culture was positive for *Morganella morganii*, sensitive to ciprofloxacin. The patient was prescribed ciprofloxacin 500 mg two times a day for 3 weeks. Two months after antibacterial treatment the patient underwent repeat TURP and cystolithotripsy due to recurrent urinary tract infections and perineal pain. Pelvic MRI demonstrating multiple bladder calculi (arrow) prior to

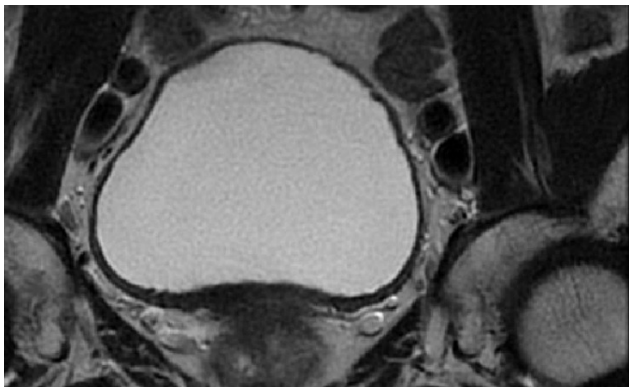


Figure 1. Preoperative pelvic MRI showing a severely distended bladder before TURP.



Figure 2. Pelvic MRI demonstrating multiple bladder calculi (arrow) prior to cystolithotripsy.

cystolithotripsy (Fig. 2). Preoperative urine culture contains *Enterococcus faecalis* and *C. urealyticum*, which was resistant to ciprofloxacin, benzylpenicillin and clindamycin, but sensitive to vancomycin and linezolid in therapeutic doses. Histologic examination of prostate tissues showed active inflammation. Vancomycin 1 g i/v was prescribed for 2 days. The patient was discharged on the 3rd postoperative day.

One month later, the patient had an outpatient consultation with a urologist, reporting weak urine flow and nocturia. The patient did not have any urinary tract infection (UTI)-related complaints after his last hospitalisation. A PSA control showed positive dynamics, and the patient was advised to continue treatment under the supervision of a family doctor and urologist, with a follow-up visits.

DISCUSSION

Encrusted cystitis is a rare chronic inflammatory bladder disease characterized by the formation of calcified plaques on the bladder mucosa, and very few cases of this disease have been published[4]. Encrusted cystitis occurs more frequently in vulnerable populations, including elderly or immunocompromised patients, and those with predisposing factors such as chronic disease, repeated urological interventions, urinary tract trauma, neurogenic bladder, intravesical chemotherapy, or prolonged catheterization[4,5].

In our patient, the diagnosis was further complicated by coexisting chronic cystitis, BPH and recurrent stone formation. This highlights the importance of maintaining a high index of suspicion in patients with recurrent or refractory UTIs, particularly those with prior hospitalizations, multiple urological procedures or chronic catheterization.

Chronic instrumentation of the urinary tract, including catheterization, cystotomy, and repeated transurethral resections, likely predisposed him to colonization with opportunistic pathogens. Indeed, urine cultures revealed a succession of atypical organisms, including *M. morganii*, *E. faecalis*, and ultimately *C. urealyticum*.

The detection of *C. urealyticum* was crucial, as it shifted the therapeutic approach from standard antimicrobial therapy to targeted management with vancomycin and surgical intervention. It is important to note that systemic antibacterial treatment alone was insufficient. A durable clinical response was achieved only after surgical debridement and stone removal was. This underscores the role of infectious calculi and mucosal incrustations as persistent reservoirs of infection, inaccessible to systemic therapy and necessitating mechanical removal.

In the literature, a combined approach to the treatment of encrusted cystitis has been reported, including antibacterial therapy and endoscopic resection of encrustations; moreover, one study suggests that urine acidification therapy in combination with glycopeptide antibiotics can inhibit urease activity, lower urine pH and ammonia concentration, indicating that successful management of encrusted cystitis may be achieved through multimodal therapy[1,3-5].

This pathogen is notably difficult to eradicate with conventional antimicrobial treatment as it often presents with resistance to commonly used agents, including fluoroquinolones and β-lactams, but remains susceptible only to vancomycin and linezolid[5].

This case underlines the therapeutic value of a comprehensive approach that combines accurate pathogen identification, tailored antibiotic treatment, and surgical management of encrustations and stones. Prompt diagnosis and early intervention are critical in preventing complications and improving patient outcomes.

CONCLUSION

This case highlights the clinical challenges posed by recurrent urinary tract infections in elderly patients with multiple urological comorbidities and prior interventions. *C. urealyticum* should be considered in patients with chronic or refractory infections, particularly when encrustations or infectious calculi are present. Standard antimicrobial therapy is often insufficient due to resistance to commonly used antibiotics, making therapy with vancomycin or linezolid the most reliable option. Effective management requires a multimodal approach with accurate microbiological diagnosis, appropriately selected antimicrobial therapy and surgical removal of incrustations and calculi. Early recognition and intervention are essential to prevent disease progression and reduce morbidity.

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