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Case Report
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Multidisciplinary Approach against *Corynebacterium* in Encrusted Cystitis

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Abstract

Corynebacterium Lipophile group F1 is a powerful urea-splitting microorganism reported as an opportunistic nosocomial pathogen causing encrusted cystitis and urinary calcifications. It is isolated from patients receiving broad spectrum of antibiotics or long-term urinary catheter carriers. Its identification is one of the biggest challenges facing the laboratory because it is usually missed in routine urine cultures since it does not grow well after an overnight incubation. Thus, its diagnosis is often delayed due to the need for specific culture media, staining techniques and electron microscopy. Herein, we report one patient with clinical suspicion of *Corynebacterium* urinary infection. However, the isolation of the pathogen was highly demanding. The aim of this case report is to highlight the need of a multidisciplinary approach to diagnose this pathogen and the establishment of protocols to make easier its diagnosis.

Keywords: Infection; Encrusted cystitis; Urinary stones; *Corynebacterium* Lipophile

Introduction

Encrusted Cystitis (EC) is a rare form of Urinary Tract Infection (UTI), especially in children [1]. Is characterized by bladder, ureteral and pelvic encrustations causing pain, bladder necrosis and occasionally renal failure or death. Such encrustations are usually composed of ammonium magnesium phosphate and calcium carbonate-apatite crystals [2,3].

Corynebacteria Species (CS) are the cause of this pathology; they are gram-positive slow-growing bacillus characterized with a strong urease activity infecting the lower and upper urinary tract [4]. CS are frequently selected by repeated broad-spectrum antibiotic therapy and are nosocomial acquired [2].

EC is treatable, but its diagnosis is often delayed. Despite suggestive symptoms and imagining features, diagnosis of EC is challenging given the need for specific culture media, staining techniques and electron microscopy [5]. There is no consensus of treatment, but multiple options have been suggested based on three complementary elements: Antimicrobial therapy; acidification of urine, chemolysis and elimination of encrustations [6,7].

Here in, we report the importance of a multidisciplinary work between urologist, radiologist, microbiologist, anatomopathologist and infectiologists. After a clinical suspicion, specific staining techniques and electron microscopy are needed for its identification. In addition, due to its multiple resistances and the tissue adherence, the antibiotic treatment may be insufficient, and a multiple approach is needed.

Case Presentation

An 18-year-old woman, with 10 years of repeated history of UTI, visited the urology department referring hypogastric pain, painful urination, and bladder stones expulsion. Normal uroflowmetry without postvoid residual urine. Laboratory workup did not reveal any clinically significant findings, except alkaline urine (pH 7.8). Standard urine culture was negative. Stone composition analysis revealed ammonium magnesium phosphate (struvite). CT pelvic scan showed thickening and calcification of the bladder wall (Figure 1). The patient went through an endoscopic transurethral resection, multiple solid neoformations coated by calcifications were resected (Figure

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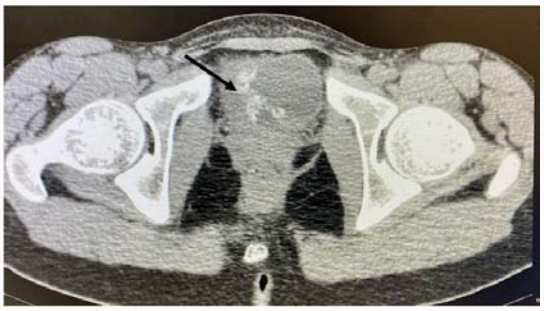

Figure 1: Basal CT scan showing an irregular thickening and calcification of the right bladder wall (arrow).

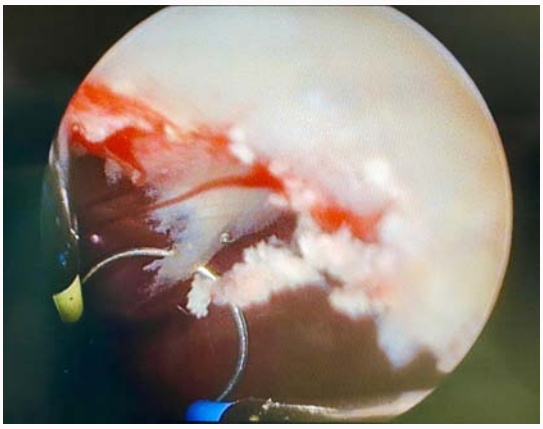

Figure 2: Endoscopic image during bipolar endoscopic resection into the bladder. Ulcer with fibrin easily friable tissue and calcifications fixed to the bladder mucosa were resected.

2). Anatomopathological analysis revealed intense mononuclear leukocyte infiltration with focal calcified encrustations (Figure 3). The procedure exacerbated the pain.

Prompting a diagnosis of EC, with pathogenic agent identification missing, a second endoscopic transurethral resection was performed. The anatomic pathology revealed again an intense mononuclear leukocyte infiltration with focal calcified encrustations. Resected tissue culture for CU revealed few copies of the bacillus suggesting that urine cultures may be positive for CU infection. To confirm the species identification, PCR and sequencing was performed on the 18S ribosomal gene DNA of the bacteria isolate revealing a *Corynebacterium* Lipophile Group F1.

We started a combined therapy with levofloxacin 500 mg every 24 h according to antibiogram results, L-metionine and acetohidroxamic acid (125 mg every 8 h). Three weeks later an endoscopic removal was performed. After one month, the symptoms of frequency, urgency and suprapubic pain disappeared. Urinalysis was normal. Ultrasonography did not show any calcification of the bladder wall.

Discussion

Many urea-splitting bacteria are responsible for EC, but CU (or *Corynebacterium* group D2) are the most frequent causative agent [5] and can be isolated from different samples including urine, blood and expelled encrustations in urine [8,9]. This fastidious and opportunistic slow-growing microorganism can be missed in routine cultures, requiring enriched media and prolonged cultures (> 48 h). Hence, clinical suspicion should be communicated to the

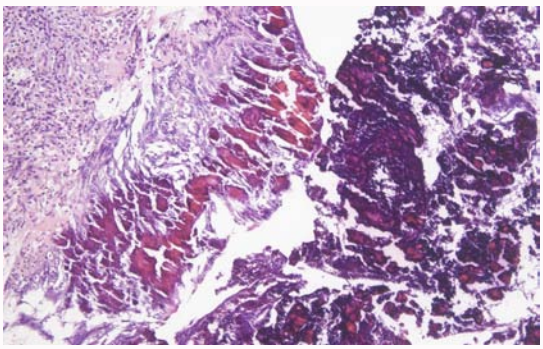

Figure 3: Anatomic pathology image revealing active chronic cystitis. Bladder wall histology after resection of calcified encrustations shows three distinct zones: A necrotic layer containing calcified encrustations (Deposits of (magnesium ammonium phosphate)), an inflammatory layer containing bacterial colonies, lymphocytes and polymorphonuclear cells, and normal tissue.

microbiologist when samples are sent for culture [10]. Another factor contributing to the delayed diagnosis is the lack of familiarity with EC and diphteroids reputation as colonizers [5].

Progress in molecular taxonomy (DNA–DNA hybridization and 16S rRNA sequencing) and in chemotaxonomy has profoundly modified the classification of *Corynebacterium* species. Amplified rDNA analysis, and amplification of the *16S-23S gene* spacer regions can differentiate between species that are difficult to be differentiated by biochemical reactions [11,12]. In our case, resected tissue culture revealed few copies of the bacillus suggesting that urine cultures may be positive for CU infection. To confirm the species identification, PCR and sequencing was performed on the 16S ribosomal gene, revealing a *Corynebacterium* lipophile group F1.

The correct identification is important because the antimicrobial susceptibilities of different coryneform bacterial isolates are quite variable [13]. In addition, antibiotic therapy must be administered with urinary acidification [7,14]. Endoscopic resection of encrustations appears necessary to remove bacteria within calcified plaques (especially when cannot be dissolved by urine acidification therapy). This combined therapy should least until the mucosa is completely recovered and repeated urine culture is negative.

Conclusion

Encrusted cystitis is not a life-threatening disease but is a very painful condition. The delayed diagnosis and drug resistance of CU makes its treatment arduous. The identification of CU is one of the biggest challenges facing the laboratory and its diagnosis demands a multifocal approach. We fall upon the importance of establishing circuits to diagnose these patients as soon as possible when there is a clinical suspicion.

References

1. Meria P, Margaryan M, Haddad E, Dore B, Lottmann HB. Encrused cystitis and pyelitis in children: An unusual condition with potentially severe consequences. Urology. 2004;64(3):569-73.
2. Martas L, Dubourdieu B. *Corynebacterium urealyticum* encrusting cystitis. Med Mal Infect. 2017.
3. Chung SY, Davies BJ, O'Donnell WF. Mortality from grossly encrusted bilateral pyelitis, uretritis and cystitis by *Corynebacterium* group D2. Urology. 2003;1:463.
4. Hager BH, Megan TB. The etiology of encrusted cystitis with alkaline

urine. JAMA. 1985:1353-5.

5. Sakhi H, Lambert OJ, Goujon A, Culty T, Loubet P, Dang J, et al. Encrusted urinary tract infections due to Corynebacteria species. Kidney Int Rep. 2020;6(1):179-86.
6. Fu JG, Xie KJ. Successful treatment of encrusted cystitis: A case report and review literature. World J Clin Cases. 2020;8(18):4234-44.
7. Sabiote L, Emiliani E, Kanashiro AK, Balañà J, Mosquera L, Martín FMS, et al. Oral acidification with L-methionine as a noninvasive treatment for encrusted urophaty. J Endourol Case Rep. 2020;6(3):143-6.
8. Hertig A, Duvic C, Chretien Y, Jungers P, Grünfeld JP, Rieu P. Encrusted pyelitis of native kidneys. J Am Soc Nephrol. 2000;11(6):1138-40.
9. Meria P, Jungers P. Encrusted pyelitis: An under diagnosed condition? Nephrol Dial Transplant. 2000;15(7):943-5.
10. Ortiz-Pérez A, Martín-de-Hijas NZ, Esteban J, Fernández-Natal MI, García-Cía JI, Fernández-Roblas R. High frequency of macrolide resistance mechanisms in clinical isolates of *Corynebacterium* species. Microb Drug Resist. 2010;16(4):273-7.
11. Bernier AM, Peters GA, Bernard K. Whole-genome sequences of four *Corynebacterium* CDC group F-1 strains isolated from urine. Genome Announc. 2017;5(5):e01537-16.
12. Salem N, Salem L, Saber S, Ismail G, Bluth MH. *Corynebacterium urealyticum*: A comprehensive review of an understated organism. Infect Drug Resist. 2015;8:129-45.
13. Otsuka Y, Kawamura Y, Koyama T, Iihara H, Ohkusu K, Ezaki T. *Corynebacterium* resistens sp. Nov., a new multidrug-resistant coryneform bacterium isolated from human infections. J Clin Microbiol. 2005;43(8):3713-7.
14. Sandee KR, Amol VP, Joel FK. More than dysuria: Corynebacterial encrusted cystitis. Urology. 2021;149:e18-21.