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Enterococcus hirae, an unusual pathogen in humans causing urinary tract infection in a patient with benign prostatic hyperplasia: first case report in Algeria

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Abstract

Enterococcus hirae is a zoonotic pathogen rarely isolated from human infections. This case is the first description of *E. hirae* causing urinary tract infection in a diabetic man with benign prostatic hyperplasia from Algeria. The clinical isolate was identified by MALDI-TOF MS and displayed a multisensitivity antibiotic profile.

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Keywords: Algeria, *Enterococcus hirae*, MALDI-TOF MS, prostate enlargement, urinary tract infection

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Introduction

Enterococci are important opportunistic pathogens and have become increasingly known as a significant cause of nosocomial and community-acquired infections; *Enterococcus faecalis* and *E. faecium* are the most common species implicated [1]. *E. hirae* is known to cause infections in animals but is rarely isolated from human clinical samples [2]. In the present report, we describe a case of *E. hirae* causing urinary tract infection in a diabetic man with benign prostatic hyperplasia. This case represents the first report of infection by this organism in Algeria.

Case report

A 50-year-old man presented with a medical history of diabetes mellitus type 2 and had prostate enlargement for approximately 1 year. He was previously hospitalized twice as a result of an inability to fully empty his bladder. He underwent urinary catheterization; however, no antibacterial therapy was administered. The last hospitalization was 2 months before this present admission.

Clinically, the patient presented with symptoms shared between benign prostatic hyperplasia, including straining to urinate, weak urine stream and inability to fully empty the bladder, and symptomatic lower urinary tract infection, including dysuria with cloudy urine, suprapubic pain, urinary frequency and urgency. The patient had a negative blood culture; however, the microscopic analysis of urine indicated the presence of white blood cells (>10 leukocytes per high-power field). The urine culture was positive, and the isolate was identified at the genus level using phenotypic methods including Gram staining, catalase test and growth on bile esculin azide agar and 6.5% NaCl media. The primary bacteriologic diagnosis indicated that the isolated strain belonged to the genus *Enterococcus*. The biochemical identification using an API 20 Strep system (bioMérieux, Marcy l'Étoile, France) could not identify the species involved. Characterization of the clinical isolate to the species level was achieved by MALDI-TOF MS (matrix-assisted laser desorption/ionization time-of-flight mass spectrometry) (Microflex; Bruker Daltonics, Bremen, Germany) using Flex Control and Biotyper 3.0 software (Bruker Daltonics) as previously described [3]. The identification of the strain by MALDI-TOF MS revealed the *E. hirae* species, with a correct identification score of 2.263. The isolate was multisensitive against nearly all antibiotics tested, including high-level (HL) aminoglycosides (HL gentamicin and HL kanamycin), ampicillin, linezolid, ciprofloxacin, nitrofurantoin and vancomycin. However, the

strain presented resistance only to trimethoprim/sulfamethoxazole. The patient received oral treatment with antimicrobial combinations of ampicillin and gentamicin for 10 days. A urethral catheter was inserted for 5 days to empty the bladder. Urine samples were analyzed during treatment until the culture result was negative. The clinical status of the patient improved after 5 days of hospitalization, and the patient was discharged and continued antibiotic therapy at home.

Discussion

Urinary tract infection (UTI) caused by enterococci is very common and is primarily due to *E. faecalis* and *E. faecium* species [4]. Most cases of urinary tract infections occur in women and are uncommon in men [5]. Prostate enlargement, also called benign prostatic hyperplasia, represents an important risk factor for UTI and bacterial prostatitis in men [5,6]. This structural abnormality is mainly associated with aging and most often affects men who are 60 years of age and older [7]. This chronic condition can prevent the bladder from emptying completely, which increases the likelihood that bacteria will grow and trigger an infection [6].

In our case, we report the occurrence of symptomatic lower UTI in a diabetic man with an enlarged prostate caused by an unusual pathogen in humans, *E. hirae*. Clinical diagnosis of our

patient showed that the infection was limited to the lower urinary tract based on the absence of clinical signs related to upper UTI, such as flank pain, vomiting and nausea [4], and to prostatitis, such as prostate pain, fever, chills, body aches and perineal pain [5,8]. Notably, in addition to prostate enlargement, urinary tract instrumentation, infection with HIV, interventions of the male urogenital tract and underlying illnesses, such as diabetes, are the main predisposing risk factors for UTI in men [8,9]. In the current case, benign prostatic hyperplasia was the main factor for the occurrence of UTI. Nonetheless, diabetes and urinary catheter indwelling performed for this patient during the previous hospitalizations represent also two other factors that may increase the risk of UTI.

The causative agent isolated in this case was identified as *E. hirae*. This species causes infections in animals, but reported cases in humans are rare [2]. This species was identified for the first time in young chickens [4]. The first report of a human infection caused by *E. hirae* was described in 1998 by Gilad et al. [10] in a case of septicemia in a 49-year-old man with renal insufficiency treated with hemodialysis. Since then, few cases have been described in humans [2,4] (Table 1). Notably, among all enterococcal infections in humans, the low incidence of *E. hirae* species has previously been described [1,4]. The bacterium may be underdiagnosed or misdiagnosed by standard identification approaches [4]. Our case demonstrates that MALDI-TOF MS is an important tool useful for rapidly and

TABLE 1. Case reports of *Enterococcus hirae* in human infections

Patient no.	Age (years)/sex, country	Diagnosis	Predisposing factors	Method of <i>E. hirae</i> identification	Source of sample	Antibiotic treatment	Reference
1	49/M, Israel	Septicemia	Hemodialysis catheter	Rapid ID 32 Strep system (bioMérieux, Marcy l'Etoile, France)	Blood	VAN	[10]
2	72/M, France	Native valve Endocarditis	Coronary artery disease	(<i>sodA_{int}</i> gene) ^b sequencing	Blood	AMP, GEN, RIF, VAN	[15]
3	55/M, Spain	Spondylodiscitis	Diabetes mellitus	VITEK 2 automated system (bioMérieux); 16S rRNA gene sequencing	Blood	AMP, GEN, LEV, SXT	[13]
4	78/F, France	Infective endocarditis	Diabetes mellitus, bioprosthetic valve	16S rRNA sequencing; <i>sodA_{int}</i> gene sequencing	Blood	AMP, GEN, RIF	[16]
5	62/F, Taiwan	Acute pyelonephritis	Unidentified	BD Phoenix ID/AST Panel Inoculation System (Becton Dickinson, Franklin Lakes, NJ, USA); <i>mur-2</i> gene ^a sequencing	Blood Urine	AMX	[4]
6	86/F, Taiwan	Acute cholangitis	Unidentified	BD Phoenix ID/AST Panel Inoculation System (Becton Dickinson); <i>mur-2</i> gene ^a sequencing	Blood	CFM	[4]
7	61/M, Korea	Bacterial peritonitis	Liver cirrhosis	Automated MicroScan WalkAway system; sugar fermentation tests	Blood Ascetic fluid	AMP	[17]
8	44/M, France	Bacteremia Pyonephrosis	Alcoholic liver disease	Undetermined	Blood Urine Kidney biopsy	AMX, CFT, AMK	[14]
9	56/M, Brazil	Native Valve Endocarditis	Diabetes, cardiac arrhythmia with surgical ablation	Undetermined	Blood	AMP, RIF, AMX	[2]
10	50/M, Algeria	Symptomatic lower UTI	BPH, diabetes mellitus, urinary catheterization	MALDI-TOF MS	Urine	AMP, GEN	This study

AMK, amikacin; AMP, ampicillin; AMX, amoxicillin; BPH, benign prostatic hyperplasia; CFM, cefmetazole; CFT, ceftriaxone; CIP, ciprofloxacin; GEN, gentamicin; LEV, levofloxacin; MALDI-TOF MS, matrix-assisted laser desorption/ionization time-of-flight mass spectrometry; RIF, rifampin; SXT, trimethoprim/sulfamethoxazole; VAN, vancomycin.

^aMuramidase gene (*mur-2*) of *E. hirae*.

^bGene encoding manganese-dependent superoxide dismutase.

correctly identifying the pathogen at the species level without any complementary tests. The ability of MALDI-TOF MS to identify bacterial colonies from agar was evaluated for a broad range of clinically relevant bacterial strains. The proper identification to the species level is achieved in 80–95% of bacterial isolates [11]. Although the strain isolated in our patient showed a sensitive profile against the majority of antibiotics tested, the study of Robredo et al. [12] showed that this species may harbour vancomycin resistance genes and may participate in their transmission to other species of enterococci. The resistance of *E. hirae* to ampicillin and high-level gentamicin has also been reported [13]. More importantly, enterococci long-term urinary tract colonization can worsen and can lead to subsequent invasive infections, such as bacteraemia [4,14].

In conclusion, we report the first case of symptomatic UTI involving *E. hirae* in a patient with benign prostatic hyperplasia from Algeria; this is the first report describing *E. hirae* in this country. This case emphasizes that MALDI-TOF MS is a powerful diagnostic tool for fast and accurate identification of this unusual pathogen at the species level.

Conflict of interest

None declared.

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