Case Report

Acute Pyelonephritis with Bacteremia Caused by Enterococcus hirae: A Rare Infection in Humans

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1. Introduction

Enterococci were initially part of the Streptococcus genus. It was not until 1984 that the Enterococcus genus was first described by Schleifer and Kilpper-Balz. Many of the members of this genus make up the resident microflora of humans [1]. Enterococcus faecalis (80%) and Enterococcus faecium (10%) are frequently associated with human infection such as bacteremia, endocarditis, and urinary tract infections. In the last decade Enterococci have been reported as the third most common cause of bacteremia [2, 3].

Enterococcus hirae accounts for less than 1% of enterococcal species isolated in human clinical samples. We describe a case of acute pyelonephritis with bacteremia in a 78-year-old woman.

2. Case Presentation

A 78-year-old female with a personal history of atrial fibrillation and chronic renal disease was admitted to the emergency room because of nausea, lipothyria, and generalized weakness. On examination the patient was oriented, vitally stable, and apyretic. There were no significant findings in the neurologic examination and the rest of the physical exam was unremarkable.

Initial laboratory findings showed an elevation of inflammatory markers with a white blood cell count of 16,400/μL with left shift (neutrophil 85.9%), C-reactive protein of 28 mg/dL, hemoglobin of 13 g/dL, platelet count of 147,000/μL, serum creatinine of 1.15 mg/dL, and urea of 75 mg/dL. Urinalysis showed leucocituria with negative nitrates and many of leucocytes. Chest X-ray, electrocardiography, and renal echography were unremarkable.

Having admitted an uncomplicated pyelonephritis, the patient was put on empirical antibiotherapy with amoxicillin-clavulanic acid after urine and blood cultures were obtained.

On the third day of antibiotherapy the patient remained afebrile and showed improvement of the laboratory findings and symptoms. The urine cultures identified Escherichia coli resistant to trimethoprim-sulfamethoxazole, cefalotin, and amoxicillin-clavulanic acid but sensitive to pipercillin-tazobactam. They also showed Enterococcus hirae resistant to cefuroxime and nitrofurantoin but susceptible to amoxicillin-clavulanic acid and pipercillin-tazobactam. This last bacterium was also isolated in the blood culture, presenting...
Table 1: Reported cases of human infections due to *E. hirae*. Adapted from Alfouzan et al. [9].

| Reference            | Year | Age/sex | Diagnosis                  | Risk factor                        | Clinical sample       | Treatment            |
|----------------------|------|---------|----------------------------|------------------------------------|-----------------------|----------------------|
| Gilad et al. [6]     | 1998 | 48/M    | Septicaemia                | End-stage renal disease; hemodialysis | Blood                 | VAN                  |
| Park et al. [10]     | 2000 | 21/F    | Acute pyelonephritis       | None                               | Blood, urine          | AMP                  |
| Poyart et al. [11]   | 2002 | 72/M    | Native valve endocarditis  | Coronary artery disease             | Blood                 | AMP, GEN, RIF, VAN   |
| Canalejo et al. [12] | 2008 | 55/M    | Spondylodiscitis           | DM                                 | Blood                 | Discectomy, AMP, GEN, LVX |
| Kim et al. [13]      | 2009 | 57/F    | Acute pyelonephritis       | Rheumatoid arthritis                | Blood, urine          | CIP, CRO, AMC        |
| Talarmin et al. [14] | 2011 | 78/F    | Infective endocarditis     | Bioprosthesis valve                 | Blood                 | AMX, GEN             |
| Chan et al. [15]     | 2012 | 62/F    | Acute pyelonephritis       | None                               | Blood, urine          | CFZ, GEN, AMP        |
| Chan et al. [15]     | 2012 | 83/F    | Acute cholangitis          | CHF, valvar heart disease           | Blood                 | CMZ                  |
| Sim et al. [16]      | 2012 | 61/M    | Bacterial peritonitis      | Cirrhosis, DM                       | Blood, ascitic fluid  | AMP                  |
| Anghinah et al. [7]  | 2013 | 56/F    | Infective endocarditis     | DM, cardiac ablation due to arrhythmia, foramen ovale | Blood                 | AMP, RIF             |
| Alfouzan et al. [9]  | 2014 | 48/M    | Multiple splenic abscesses  | DM                                 | Blood, pus            | Splenectomy, AMP, PTZ, LAZ |

the same sensitivity profile. Due to the resistance patterns of both microorganisms we decided to change the antibiotic to piperacillin-tazobactam. Treatment options were discussed with the Microbiology Department: given the fact that there was the isolation of a multiresistant *E. coli* strain and the patient was clinically improving, the antibiotherapy was maintained, and a total of 14 days of piperacillin-tazobactam was completed.

Upon identification of the *Enterococcus hirae* a more detailed epidemiological interview was conducted. The patient mentioned having had contact with farm animals such as birds, namely, parrots, dogs, horses, and cats a month before, while staying in a country house.

3. Discussion

*Enterococcus hirae* is a pathogen frequently associated with infections in animal species, particularly in psittacine birds, cats, and rats [4, 5]. The first report of human infection by this agent was described by Gilad et al. in 1998 [6] in a patient with end-stage renal disease, undergoing hemodialysis, and presenting with septicemia [7].

According to most reviews, the prevalence of nonfaecalis and nonfaecium Enterococci ranges from 2 to 10% [8].

To the best of our knowledge, there are only eleven reports describing human infection in the literature [9] (Table 1). Amongst the cases described are infections of native and prosthetic valves, acute pyelonephritis, septicemia, and spondylodiscitis.

Our case is the fourth case of acute pyelonephritis with bacteremia and the twelfth, worldwide, reported case of established human infection caused by *Enterococcus hirae*.

Enterococci are relatively resistant to many antibiotics that are active against Gram-positive cocci, including cephalosporins, macrolides, and clindamycin. Penicillins and glycopeptides have the best *in vivo* activity. However, ampicillin typically has greater *in vitro* killing ability than vancomycin. Enterococci have an intrinsic low-level resistance to the aminoglycosides due to the decreased ability of these agents to penetrate the cell wall. This can be overcome by the addition of cell wall-active agents (such as penicillins and glycopeptides) resulting in a synergistic killing effect [8].

The true incidence of the infections caused by this agent may be underestimated because of the misidentification of some species due to the exhibition of aberrant sugar reactions by some Enterococci or due to lack of application of the appropriate tests to identify rare species of Enterococci [8]. This finding is of some concern. A study conducted in a tertiary South Indian hospital investigated the prevalence of unusual and atypical species of Enterococci causing human infections. Forty-three percent of the isolates were from cases of septicemia, which illustrates the virulence of these species [8]. It is, thus, important to raise awareness of these rare pathogens in order to increase their detection and prompt the introduction of accurate antibiotherapy guided, whenever possible, by the susceptibility profile.

*E. hirae* is a rarely isolated pathogen in humans but it is underreported due to misidentification. Currently it is estimated to represent 1–3% of all enterococcal species isolated in clinical practice [12]. In our case, there was a clear epidemiological context in which our patient had contact with birds, the species most often affected by this pathogen.
Competing Interests

The authors declare that they have no competing interests.

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