

Sepsis due to *Vibrio alginolyticus* isolated from catheter of young patient with hypercholesterolemia: the first case from Turkey

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Abstract: *Vibrio alginolyticus* occasionally causes life-threatening infections in immunocompromised individuals. Bacteremia and necrotising fasciitis caused by *V.alginolyticus* have been reported. We described a case of sepsis due to *V. alginolyticus* isolated from catheter of 19-year-old patient with hypercholesterolemia. Moreover the cases of invasive *V.alginolyticus* reported in the literature were reviewed. Blood cultures of the patient were evaluated by the BACTEC 9120 system. The identification of the bacteria was performed conventional methods and confirmed by the automatized ID32GN and VITEK 2 automation systems. Antibiotic susceptibility tests were performed according to recommendations of Clinical Laboratory and Standards Institute (CLSI). The patient recovered due to early diagnosis and appropriate therapy. No identifiable source of this infection could be determined. In conclusion, rapid and correct identification of the bacteria and early administration of appropriate antibiotics is essential for controlling invasive *Vibrio* infections, such as *V.alginolyticus* sepsis, especially in immunocompromised hosts. To the best of our knowledge, this is the first report of *V.alginolyticus* bacteremia in Turkey.

Keywords: *Vibrio alginolyticus*, Bacteremia, Sepsis, Hypercholesterolemia, Turkey

1. Introduction

Vibrios have been recognized as human pathogens, and they can be acquired through either ingestion of contaminated seafood or contact of traumatized skin with seawater(1). Extraintestinal *Vibrio* infections are most commonly cutaneous wounds or otitis externa, where breaks in the skin have become contaminated while swimming or boating in infected marine waters or after handling contaminated raw seafood. Most clinical isolates are recovered from superficial wounds or the external ears (2). Other *Vibrio cholera*, less common halophilic *Vibrio spp* include *V.vulnificus*, *V.alginolyticus*, *V.fluvialis*, *V.hollisae*, *V.damsale*. Molecular methods can be suggested for identification or detection of these species (15).

V.alginolyticus, first identified as a pathogen of humans in 1973, has been predominantly associated with cellulitis and acute otitis media or externa rather than gastroenteritis (1,14). *V.alginolyticus* occasionally causes life-threatening infections in immunocompromised individuals (5). Conjunctivitis, acute gastroenteritis, bacteremia and necrotising fasciitis caused by *V.alginolyticus* have also been reported (2). Bacteremic infections of *V.alginolyticus* are severe and occur only in

patients with underlying diseases (12).

We described a case of sepsis due to *V. alginolyticus* isolated from catheter of 19-year-old patient with hypercholesterolemia in this paper. To the best of our knowledge, this is the first report case of *V.alginolyticus* bacteremia in Turkey.

2. Case

A 19-year-old patient was admitted to Department of Pediatric Cardiology, Istanbul Faculty of Medicine with high fever about ten days before admission although he was given amoxicillin+clavulanate. He was applied routinely lipid apheresis because of diagnosed with genetic hypercholesterolemia Type 2a while he was seven years old. He was being followed by Nutrition and Metabolism Department. A catheter had inserted to him before one and a half years.

The patient presented with high fever (39°C) on admission. Blood cultures were obtained from the catheter and peripheral vein. After three days, the result of blood cultures was reported as *V.alginolyticus*. At the same time, the situation of the patient was deteriorated, by increase of C-reactive protein (CRP: 103 mg/dl) and went to sepsis. He had empirically started on meropenem and teicoplanin before blood culture result was

available. Blood cultures were taken from the catheter and from a peripheral vein again. The same bacteria was isolated from blood culture obtained catheter again. According to blood culture result, he continued on meropenem I.V. 1 g (3x1) therapy. CRP of the patient decreased (CRP: 14 mg/dl). The patient recovered and discharged after 17 days. No identifiable source of this infection could be determined.

3. Materials and Methods

Blood cultures were evaluated on the BACTEC 9120 system (Beckton Dickinson, USA). After positive signal, the blood samples were inoculated sheep-blood and chocolate agar (bioMerieux, France). When the colonies were seen on sheep blood agar, they're subcultured on thiosulfate-citrate-bile salts-sucrose (TCBS) agar. The identification of the bacteria were performed by conventional methods and confirmed by the API ID 32 GN system (bioMerieux, France) and by the VITEK 2 system (bioMerieux, France). Antibiotic susceptibility tests were performed by standard disc diffusion and by E-test method according to the recommendations of Clinical and Laboratory Standards Institute (CLSI) (6).

Table 1. Some biochemical characteristics of *V.alginolyticus* isolate.

Test	Reaction
Growth on sheep blood agar (swarming)	Positive
Growth on Mac Conkey agar	Positive
Growth in Nutrient Broth with:	
0% NaCl	Negative
1% NaCl	Positive
6% NaCl	Positive
8% NaCl	Positive
10% NaCl	Positive
Motility	Positive
Cytochrome oxidase	Positive
Catalase	Positive
Carbohydrate fermentation:	
Glucose	Positive
Lactose	Negative
Mannose	Positive
Mannitol	Positive
Maltose	Positive
Sucrose	Positive
Ribose	Positive
Sorbitol	Negative
Rhamnose	Negative
Inositol	Negative
Nitrate reduction	Positive
Simmons citrate	Negative
Indole	Positive
Voges-Proskauer	Positive
Lysine decarboxylase	Positive
Ornithine decarboxylase	Positive
Arginine decarboxylase	Negative
L-alanine	Negative
L-arabinose	Negative
Hydrogen sulfide	Negative
Esculin	Negative
Gas production	Negative
Urea hydrolysis	Negative
Alkaline phosphatase	Positive
N-acetyl glucosamine	Positive
Glycogen	Positive

3.1. Microbiology

While blood culture obtained from the peripheral vein remained negative, a positive signal was taken on the blood culture bottle from the catheter. Gram negative rods were seen in Gram stain prepared from positive blood culture bottle. After 24 hours of incubating the culture-positive samples, straight or curved, Gram-negative, oxidase-positive colonies were seen on sheep-blood and chocolate agar. The colonies were smooth, convex, creamy in consistency, and gray-white with full margins. Yellow colonies were seen on TCBS agar after 24 hours of incubation. Further identification was confirmed with the following biochemical tests. The strain showed a positive reaction to indol production, Voges-Proskauer, lysine decarboxylase, and ornithine dihydrolase, glucose fermentation, gelatin hydrolysis, reduction from nitrate to nitrite, alkaline phosphatase and growth in Nutrient broth with 6-10% NaCl. Negative findings included: growth on Simmons' citrate, growth in Nutrient broth with 0% NaCl, H₂S on tri-sugar iron agar (TSI), gas production, urea hydrolysis, and arginine decarboxylase, myo-inositol, lactose fermentation. Some biochemical characteristics of the bacteria were showed in Table 1.

Table 2. The results of antibiotic susceptibility test of *V.alginolyticus* isolate. The disc diffusion method to some antibiotics for antimicrobial susceptibility testing of this organism has not been standardized, although the method is used.

Antibiotics	Susceptibility
Ampicillin	Resistant
Cephazolin	Susceptible
Cefuroxime	Susceptible
Cefotaxime	Susceptible
Imipenem	Susceptible
Meropenem	Susceptible
Chloramphenicol	Susceptible
Trimethoprim-sulfamethoxazole	Susceptible
Gentamycin	Susceptible
Tobramycin	Susceptible
Amikacin	Susceptible
Ciprofloxacin	Susceptible
Colistin	Susceptible
Erythromycin	Susceptible

The string test of the colonies was positive. In the string test, which lyses the vibrio cells, but not those of *Aeromonas spp* and *Plesiomonas shigelloides*, the strain was emulsified in 0.5% sodium deoxycholate (3). The bacteria were identified as *V. alginolyticus* by the API ID 32 GN system (bioMerieux, France) at a 95.3% confidence level and by the VITEK 2 system (bioMerieux, France) at a 93% confidence level. *V. alginolyticus* was isolated from the catheter while blood culture obtained from the peripheral vein remained sterile.

The organism was susceptible to a variety of antibiotics including cephazolin, cefuroxime, cefotaxime, gentamicin, trimethoprim-sulfamethoxazole, ciprofloxacin, but ampicillin resistant. The results of antibiotic susceptibility testing were showed in Table 2.

4. Discussion

V.alginolyticus is a curved, motile, halophilic, Gram negative bacillus that is considered part of normal marine flora (4). The organism derived its name from its ability to utilize alginate. This species is the most salt-tolerant among the pathogenic *Vibrio* species and can even grow in extremely high salt concentrations (as high as 10%). *V.alginolyticus* is considered relatively non-pathogenic in humans. The reason for *V.alginolyticus*'s lack of virulence remains unclear. Its virulence is related to its ability to produce hemolysis, hemagglutination and protease (5,14). *V.vulnificus* and *V.alginolyticus* are more associated with soft tissue wound infection and sepsis(15). Isolation of *V.alginolyticus* is similar to that for *V.vulnificus*; however, *V.alginolyticus* does not ferment lactose (1).

V.alginolyticus has rarely been associated with respiratory tract infections and bacteremia, illnesses that may result in death in immunocompromised patients. In contrast to bacteremia caused by *V.vulnificus*, a highly invasive *Vibrio* species, sepsis has rarely been attributed to *V.alginolyticus* (4,15).

It has been rarely reported that *V.alginolyticus* causes deep-seated or invasive infections. *V.alginolyticus* sepsis has lower pathogenicity, compared with *V. vulnificus*. The relative mortality of *V.alginolyticus* sepsis is also lower than that of *V. vulnificus* (5).

In the search of the PUBMED database with keywords "*V.alginolyticus* bacteremia", we found few cases of bacteremia caused by *V.alginolyticus*. The similar features of these patients were their predisposing factors such as cirrhosis, cancer, hemodialysis, burn, leukemia, sarcoma, chronic osteomyelitis and steroid therapy (4,5,7,8,10,11). The patient who get routinely lipid apheresis in this report, had genetic hypercholesterolemia Type 2a and a catheter had inserted to him before one and a half years. His genetic diagnosis, implementation of apheresis and inserted catheter were predisposing factors of this patient. The patient recovered due to early diagnosis and appropriate therapy.

Vibrio species are usually resistant to penicillins and vancomycin, but are susceptible to tetracycline, chloramphenicol, aminoglycosides and the other β -lactam antibiotics(13). Tetracycline treatment usually results in cure(14). *V.alginolyticus* strain in this report was found to be resistant to penicillin, ampicillin and trimethoprim-sulfamethoxazole but susceptible to the other antibiotics.

In conclusion, rapid and correct identification of the bacteria and early administration of appropriate antibiotics is crucial for controlling invasive *Vibrio* infections, such as *V.alginolyticus* sepsis, especially in immunocompromised hosts.

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