Isolation of *Vibrio alginolyticus* from a patient with chronic otitis media: Report of case and review of biochemical activity

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This halophilic organism was isolated from the middle ear fluid specimen from a 22-year-old man with a long-standing history of asthma and chronic otitis media with recurring infections, who related that he had recently been swimming in the Atlantic Ocean. Although this uncommon pathogen seldom is implicated in ear infections, it should be cultured for when the patient has a history of swimming in salt water. Infections caused by *V. alginolyticus* usually are self limiting, but in this case the organism was found to be resistant to the penicillins and vancomycin, antibiotics that are commonly employed in the treatment of otitis media. The patient responded well to chloramphenicol therapy. The biochemical activity of the isolate and the most useful microbiologic characteristics for differentiating *V. alginolyticus* from the other *Vibrio* species are discussed in depth.

The etiologic agent of cholera, *Vibrio cholerae* O-group-1, historically has been the vibrio organism of greatest interest to physicians and microbiologists. Initially, other vibrios were not considered to be clinically significant. They were categorized as nonagglutinable vibrios (NAG), because they did not agglutinate in *V. cholerae* O-group-1 antiserum, or as noncholera vibrios (NCV).

It was not until the NCV/NAG group was subdivided into separate species, which occurred in the mid-1930s, that it became apparent that several of these, including *V. parahemolyticus*, *V. vulnificus*, the non-O-group 1 portion of *V. cholera* species, and *V. alginolyticus*, are often pathogenic for humans.¹

In addition, two *Vibrio* species, group F (EFG) *Vibrios* and *V. mestchnikovii*, are of uncertain pathogenicity for humans. Six of 9 halophilic *Vibrio* species have been named since 1979.² The clinical features, ecologic niches, pathogenic mechanisms, and epidemiologic characteristics of vibrios other than O-group 1 *V. cholerae* are described elsewhere.³⁻⁵

The purpose of this case study is to report an unusual isolate, *V. alginolyticus*, from a patient with chronic otitis media. Microbiologists usually encounter one of the following microorganisms from properly collected ear specimens from patients with otitis media: *Streptococcus pneumoniae*, *Hemophilus influenzae*, *Streptococcus pyogenes*, *Staphylococcus aureus*, or *Branhamella catarrhalis*.⁶ Halophilic vibrios (those that require a high concentration of salt for optimal growth) such as *V. alginolyticus* have only recently been recognized as human pathogens, usually after the patient's exposure to seawater.

Report of case

A 22-year-old white man had a long-standing history of asthma triad (asthma, nasal polyps, and sensitivity to aspirin), as well as chronic serous otitis media with recurrent infection. The patient was admitted in November 1984 through the Short Procedure Unit. Preadmission testing showed all parameters to be within normal limits. Symptoms prior to hospitalization included fullness in ear, drainage, and conductive hearing loss.

The patient previously had recurrent serous otitis media with associated asthma and nasal polyps, with secondary chronic sinusitis. The pressure equalization tube was clogged and nonfunctioning prior to surgery. Surgery was indicated to remove apparent granulation tissue and replace pressure equalization tube, which would allow further medical treatment to be successful.

The patient was taken to the operating room, and bilateral myringotomy, insertion of pressure equalization tubes, right middle ear exploration, removal of granulation tissue, and removal of a Goode tube from the right ear were performed. At surgery, the middle ear mucosa

TABLE 1. BIOCHEMICAL CHARACTERISTICS OF *VIBRIO ALGINOLYTICUS* ISOLATE.

Test	Reaction
Growth on thiosulfate citrate bile salts (TCBS) a agar	Yellow colonies
Growth in chocolate agar	Positive
Growth on MacConkey a agar	Positive
Growth on sheep blood agar	Positive (swarming)
Hemolysis on sheep blood agar	Negative
Cytochrome oxidase	Positive
Catalase	Positive
Anaerobic dextrose	Positive
Aerobic dextrose	Positive
Maltose	Positive
Lactose	Negative
Sucrose	Positive
Xylose	Negative
Salicin	Negative
Arginine dihydrolase	Negative
Lysine decarboxylase	Positive
Ornithine decarboxylase	Positive
Urease	Negative
ONPG	Negative
Indole	Negative
Nitrate	Positive
Phenylalanine deaminase	Negative
Citrate	Negative
Motility	Positive
Acetate	Negative
Voges-Proskauer	Positive*
Triple sugar iron agar	†Acid/acid
Deoxyribonuclease	Positive
Sodium chloride (NaCl) tolerance:	
Growth in 0% NaCl	Negative
Growth in 1% NaCl	Positive
Growth in 3% NaCl	Positive
Growth in 6% NaCl	Positive
Growth in 8% NaCl	Positive
Growth in 10% NaCl	Positive (weak response)

*Response was positive when 3% NaCl was added to the culture medium.

†Acid/acid indicates the fermentative action of the organism on the 3 sugars present in the test medium: glucose, lactose, and/or sucrose.

was more edematous than previously noted and granulation tissue was present in the area of the incision site. The surgery was well tolerated by the patient, and he was discharged later in the day. He was given Cortisporin Otic Suspension and instructed to use 4 drops in each ear 4 times a day.

A right middle ear fluid specimen had been submitted to the microbiology laboratory for aerobic culture. After 18 hours' incubation, a pure culture of *V. alginolyticus* was observed on 5-percent sheep blood agar, chocolate agar, and MacConkey agar plates. After 48 hours, both *V. alginolyticus* and *Staphylococcus* coagulase negative were isolated from broth culture. Further questioning of the patient revealed that he had recently been swimming in the Atlantic Ocean along the New Jersey coast. He was treated successfully with chloramphenicol. Chloramphenicol was selected because of its broad-spectrum coverage for *V. alginolyticus* and *Staphylococcus* coagulase negative as determined on in vitro antimicrobial susceptibility testing. The role of the *Staphylococcus* co-

TABLE 2. BAUER-KIRBY DISK DIFFUSION SUSCEPTIBILITIES OF *VIBRIO ALGINOLYTICUS* ISOLATE.

Antibiotic	Susceptibility
Methicillin	Resistant
Ampicillin	Resistant
Carbenicillin	Resistant
Penicillin	Resistant
Piperacillin	Resistant
Cephalothin	Susceptible
Cefamandole	Susceptible
Cefoxitin	Susceptible
Cefotaxime	Susceptible
Cefoperazone	Susceptible
Amikacin	Susceptible
Gentamicin	Susceptible
Chloramphenicol	Susceptible
Erythromycin	Susceptible
Trimethoprim-sulfamethoxazole	Susceptible
Vancomycin	Resistant
Tobramycin	Susceptible

agulase negative in the infection was questionable, because it was isolated in broth culture only after 48 hours of incubation.

The *V. alginolyticus* isolate was initially identified with the Minitek Nonfermenter System (BBL, Cockeysville, Maryland). Like other halophilic vibrios, the isolate fermented glucose, was positive for oxidase and lysine decarboxylase, and was motile (Table 1). Distinguishing the isolate from other halophilic vibrios were the facts that it fermented sucrose and not lactose, and that it grew in a 10-percent sodium chloride solution. Gram's staining revealed curved, gram-negative rods. In vitro susceptibility testing determined the isolate to be resistant only to the penicillins and vancomycin (Table 2). The isolate was submitted to a reference laboratory for confirmation of identification.

The most useful microbiologic characteristics for differentiating *V. alginolyticus* from the other *Vibrio* species are fermentation of sucrose, negative fermentation reaction for lactose, growth in 10-percent sodium chloride solution, negative O-nitrophenyl-B-D-galactopyranoside, swarming on 5-percent sheep blood agar plate, and positive Voges-Proskauer reaction. It should be noted that the Voges-Proskauer reaction was initially negative when the Minitek Nonfermenter identification system was used; however, the reaction was positive when the Voges-Proskauer medium was supplemented with 3-percent sodium chloride.

Discussion

There have been only a few reported instances of isolation of *V. alginolyticus* from the ear,^{3,5,8} but it has been implicated as an etiologic agent of otitis externa and otitis media. The organism primarily has been isolated from feces and skin.⁸ Its role in infectious diarrhea has not been demonstrated; the organism has been isolated repeatedly from asymptomatic individuals who had ingested raw seafood. However, *V. alginolyticus* has been in-

creasingly implicated in skin infections, including abscesses, cellulitis, and ulcers.

V. alginolyticus usually has been isolated in mixed cultures. Exposure to marine environments usually antedates infection, although in at least one report⁷ this setting could not be confirmed. Unlike *V. vulnificus* and some of the other pathogenic halophilic vibrios, infections caused by *V. alginolyticus* typically are self limiting, with response to no treatment or only to local therapy in the normal host. In striking contrast to the highly invasive *V. vulnificus*, bacteremia has rarely been reported with *V. alginolyticus*.⁹

Summary

Vibrio species other than *V. cholera* have been associated with disease. The organisms are increasingly being recognized as human pathogens in parts of the world where cholera is not endemic. *V. alginolyticus* is one such microorganism that should be considered as an etiologic agent of otitis media and wound infections from patients using coastal water facilities for either occupational or recreational purposes. Thorough history taking is therefore essential if the organism is to be considered an infectious agent.

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