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Vibrio alginolyticus Infections in Humans

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Two clinical isolates of *Vibrio alginolyticus* from New Jersey are reported, one from a mixed stump infection and the other grown in pure culture from the conjunctival discharge of a man with conjunctivitis. The biochemical characteristics and antibiotic susceptibilities of these two isolates are presented. Human infections caused by *V. alginolyticus* are reviewed.

Halophilic vibrios have only recently been recognized as human pathogens, usually after exposure to seawater (1, 8, 16, 17). They are distinct from noncholera vibrios and include *Vibrio parahaemolyticus*, the lactose-fermenting vibrios, and *Vibrio alginolyticus* (3, 4, 9). The latter has been isolated mainly from skin and ear infections (2, 12, 13, 15).

The purpose of this report is to describe the characteristics of two recent isolates of *V. alginolyticus* from patients in whom the clinical presentation did not suggest the presence of this organism.

MATERIALS AND METHODS

Case 1. A 43-year-old white man was hospitalized in October 1978 for pneumococcal pneumonia with positive blood culture. He was a heavy drinker and worked as a fish cutter. On admission, he was noticed to have markedly infected conjunctivae with purulent discharge from the left eye. A culture of this discharge revealed pure growth of *V. alginolyticus*. He was treated with procaine penicillin intramuscularly and sulfisoxazole eye drops with rapid response.

Case 2. A 57-year-old white man was admitted in October 1978 for a stump ulcer. He had a below-knee amputation for a traumatic injury 17 years ago. Five years before admission, his inferior vena cava had been ligated because of pulmonary emboli. Since then he had severe edema of this lower extremity. During the last 4 months he had oozing stump wounds without fever. He denied any seawater exposure in recent years. Physical examination revealed marked edema of the legs. The right leg stump was tender, distally indurated, and ulcerated, with foul-smelling purulent drainage. Aerobic cultures from these ulcers grew *V. alginolyticus* and non-group A beta-hemolytic streptococci, *Proteus mirabilis*, and *Proteus morganii*. He was treated successfully with debridement, local povidone-iodine application, and leg elevation.

RESULTS

Both isolates of *V. alginolyticus* were initially identified with the API 20E system (Analytab Products, Inc., Plainview, N.Y.). The identification of the isolates was confirmed by the Bacteriology Section, Center for Disease Control, Atlanta, Ga. The biochemical reactions (Table 1) and antibiotic sensitivities (Table 2) of both isolates were almost identical. They were short, gram-negative rods. Like other halophilic vibrios, they fermented glucose, were positive for oxidase and lysine decarboxylase, and were motile. They fermented sucrose, had positive Voges-Proskauer reaction, and did not ferment lactose. Neither strain grew in 10 g of NaCl per dl. The interpretation of the disk diffusion method for antimicrobial susceptibility testing of this organism has not been standardized. Although both isolates were sensitive to a variety of antibiotics, including trimethoprim-sulfamethoxazole, but resistant to the penicillin group of antibiotics, colistin, and clindamycin when tested by the Kirby-Bauer disk diffusion technique, the validity of these results can be questioned.

DISCUSSION

V. alginolyticus is one of many gram-negative bacteria of marine origin (1) with worldwide distribution, having been isolated from Europe (1, 10, 15), Australia (13), Japan (17, 23, 24), Hawaii (1, 12), and North America (1, 2, 5, 14, 21). Recent exposure to seawater usually antedates the isolation of *V. alginolyticus* from humans, although infrequently such a history cannot be obtained (7, 12, 18, 22). An example of the latter is the second patient described in this report.

As shown in Table 3, the feces, skin, and ear account for most human isolates of *V. alginolyticus* reported in the English literature. In Japan it has been isolated from stool specimens in 0.5% of healthy people during the summer months due to ingestion of contaminated raw seafood; this stool carriage is not associated with

TABLE 1. *Biochemical characteristics of two V. alginolyticus isolates*[a]

Test	Reaction
Growth on sheep blood agar (swarming)	+
Growth on MacConkey agar	+
Growth in nutrient broth[b] with:	
0% NaCl	−
1% NaCl	+
6% NaCl	+
8% NaCl	−
10% NaCl	−
12% NaCl	−
Motility	+
Lysine decarboxylase	+
Ornithine decarboxylase	+
Cytochrome oxidase	+
Lipase	+
Catalase	+
Carbohydrate fermentation	
Glucose	+
Mannose	+
Mannitol	+
Maltose	+
Sucrose	+
Trehalose	+
Glycerol	+
Galactose	+/−[c]
Inositol	−
Sorbitol	−
Rhamnose	−
Gelatinase	+
Nitrate reduction	+
Simmons citrate	+
Indole	+
Jordan tartrate	+
Voges-Proskauer	−
Phenylalanine deaminase	−
Tryptophan deaminase	−
Beta-galactosidase	−
Arginine dihydrolase	−
Hydrogen sulfide	−
Sodium malonate	−
Sodium acetate	−
Melibiose	−
Amygdalin	−
Arabinose	−
Lactose	−
Dulcitol	−
Adonitol	−
Raffinose	−
Xylose	−
Cellobiose	−
Erythritol	−
Esculin	−

[a] Results from API 20E system in our laboratory plus testing at Bacteriology Section, Center for Disease Control, Atlanta, Ga. (including salt tolerance).
[b] Difco beef extract (8 g) in 100 ml of water.
[c] Strain 1/strain 2.

TABLE 2. *Disk susceptibilities of the two V. alginolyticus isolates*[a]

Antibiotic	Susceptibility[b]	
	Isolate 1	Isolate 2
Penicillin	R	R
Ampicillin	R	R
Carbenicillin	R	R
Colistin	R	
Clindamycin	R	R
Sulfadiazine	S	R
Trimethoprim-sulfamethoxazole	S	S
Nalidixic acid	S	S
Cephalothin	S	S
Tetracycline	S	S
Erythromycin		S
Chloramphenicol	S	S
Kanamycin	S	S
Gentamicin	S	S
Tobramycin	S	S

[a] The disk diffusion method for antimicrobial susceptibility testing of this organism has not been standardized, although the method is used (6).
[b] R, Resistant; S, susceptible.

TABLE 3. *Human isolates of V. alginolyticus reported in the English literature*

Source	No. of isolates	References
Feces	372	17, 23
Skin infections	43	1, 2, 5, 12–15, 19, 22
Ear infections	16	1, 2, 7, 11, 12, 15, 21
Blood	2	5, 8
Eye	2	2, 19
Sputum	1	2

clinically evident intestinal infection (17, 24). The majority of nonfecal isolates have been from patients with skin infections, including ulcers, cellulitis, and abscesses (1, 2, 5, 12–14, 18, 20). Infections of the ear (otitis media and otitis externa) are another important source of isolates of *V. alginolyticus* (1, 2, 7, 11, 12, 15, 22). *V. alginolyticus* has rarely been recovered from sputum and an eye socket (2). Ocular infection due to this organism is extremely rare (18). One of the patients described in this report had conjunctivitis that was almost certainly due to this organism, which was presumably acquired through his occupation as a fish cutter. In most reports the pathogenic role of *V. alginolyticus* was not well defined. The organism was usually found in mixed flora (7, 12–14, 22), although often in seemingly significant numbers (5, 12, 13, 18). There are, however, several infections that have been associated with the isolation of *V. alginolyticus* in pure culture (11, 12, 14, 15). Invasiveness as defined by bacteremia occurs infrequently (5, 8). Most patients have a benign course (9, 11, 22), often with response to no (13) or only local (12, 14) therapy, a striking contrast to the pathogenic potential of other halophilic vibrios (3, 9).

If antibiotic therapy is indicated, it should be based on in vitro susceptibility testing. The organism has been found to be resistant to the penicillins and vancomycin, variably sensitive to erythromycin, cephalothin, and colistin, and sensitive to tetracycline, chloramphenicol, trimethoprim-sulfamethoxazole, and gentamicin (5, 7, 8, 11, 12, 14, 15, 18).

The microbiological criteria generally relied on to distinguish *V. alginolyticus* from other *Vibrio* species, including *V. parahaemolyticus* and lactose-positive vibrios, are the following: (i) growth in 10 g of sodium chloride per dl; (ii) swarming on agar; (iii) positive Voges-Proskauer reaction; and (iv) fermentation of sucrose (3, 12, 14, 16, 20, 23). However, several fecal isolates from Japan (24) and 7 of 14 isolates described in the second edition of the *Manual of Clinical Microbiology* (6) were intolerant of high sodium chloride concentrations. The two isolates described in this report failed to grow in 8 to 10% sodium chloride. Swarming on agar has been described also for *V. parahaemolyticus* (20) and is not a constant feature of *V. alginolyticus* (19), and nonmotile strains have been described (7, 19). Sucrose fermentation also may vary (19, 20), so that the accepted criteria for identification of *V. alginolyticus* can be lacking or minimal, thus making identification as to species difficult for clinical microbiology laboratories.

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