

Wound Infection Caused by Kanagawa-Negative *Vibrio parahaemolyticus*

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Received 16 March 1984/Accepted 18 June 1984

Kanagawa-positive *Vibrio parahaemolyticus* strains are considered to be human pathogens and are most commonly associated with summer diarrhea. Kanagawa-negative strains are most frequently isolated from the environment and are generally considered to be nonpathogens. We report a wound infection caused by a Kanagawa-negative *V. parahaemolyticus* strain. The infection occurred in October, an unusual time of the year for a *V. parahaemolyticus* infection to occur in the mid-Atlantic region of the United States.

Vibrio parahaemolyticus, a facultative halophile, has been isolated from estuarine and coastal waters throughout the world. Seasonally distributed, vibrios in large numbers are found in the water column in the summer but in sediment in the winter (5). Seafood harvested from these waters contains *V. parahaemolyticus*, notably attached to the chitinous exoskeleton. The organism is important clinically as a frequent cause of diarrheal disease resulting from ingestion of improperly processed seafood (2). The Kanagawa phenomenon, i.e., hemolysis on a specially prepared blood-containing medium (Wagatsuma agar) (4), has been used to biotype the species. Kanagawa-positive (beta-hemolytic) strains, isolated most frequently from clinical specimens, are considered to be pathogens. Kanagawa-negative (nonhemolytic) strains, isolated almost exclusively from the environment, are not usually associated with disease (12). We now describe a patient with a wound infection caused by a Kanagawa-negative *V. parahaemolyticus* strain.

A 39-year-old male without underlying disease sought medical attention in October 1983 for an infected right thumb. Three days before presentation, the patient received a puncture wound in the right thumb while shucking oysters.

At presentation the patient was afebrile. The lesion on his right thumb was erythematous, with purulent material under the thumbnail and at the tip of the thumb, but without discharge. The joint was not involved. Specifically, the wound was an abscess with localized cellulitis. The physical examination was otherwise unremarkable.

The abscess was incised and drained, and the purulent material was sent for culturing. The patient was treated with cloxacillin, 500 mg every 6 h. At follow-up 4 days after the incision and drainage, the thumb was healing well. Erythema was resolving, and there was no exudate. On the basis of results from the clinical microbiology laboratory, therapy was changed to trimethoprim-sulfamethoxazole. The patient recovered from the infection without complications.

The purulent specimen from the thumb abscess was cultured as follows. The specimen was inoculated onto blood agar, MacConkey agar, chocolate agar, and Columbia agar and into thioglycolate medium (BBL Microbiology Systems, Cockeysville, Md.). A Gram stain was performed, but the

results were not recorded, suggesting that the Gram stain result was consistent with the culture results. After aerobic incubation, the specimen grew two organisms: a few colonies of *Klebsiella pneumoniae* (MicroScan no. 7754437; American Scientific Products, McGaw Park, Ill.) and moderate growth (growth in the first and second quadrants of a four-quadrant streak) of a gram-negative bacillus not identified to the species level by the API 20E system (Analytab Products, Plainview, N.Y.) biochemical reactions (API no. 1046106); however, a *Vibrio* species was suspected. As determined by the Bauer-Kirby technique, the suspected vibrio was resistant to ampicillin and carbenicillin and susceptible to tetracycline, cephalothin, cefoxitin, cefamandole, chloramphenicol, gentamicin, tobramycin, kanamycin, amikacin, and trimethoprim-sulfamethoxazole.

The suspected vibrio was sent to a reference laboratory for identification. The reference laboratory used 94 taxonomic characteristics to identify the organism as *V. parahaemolyticus* (17). Of these tests, the key biochemical and culture characteristics of the organism were as follows: positive reactions for oxidase, nitrate, growth at 42°C, lysine decarboxylase and ornithine decarboxylase; positive reactions for D-gluconate, L-glutamate, L-leucine, L-serine, putrescine, and ethanol as sole sources of carbon; negative reactions for Voges-Proskauer, gas from glucose, swarming, Kanagawa phenomenon (Wagatsuma agar), *o*-nitrophenyl- β -D-galactopyranoside, and arginine decarboxylase; negative reactions for valerate, γ -aminobutyrate, and sucrose as sole sources of carbon; no growth at 0% NaCl, growth at 3 to 8% NaCl, and no growth at 10% NaCl; and blue-green colonies with a darker blue-green center on thiosulfate-citrate-bile salts-sucrose agar.

New developments in bacterial taxonomy have made it difficult to determine the exact number of clinical reports of extraintestinal *V. parahaemolyticus* infections. Some organisms originally reported as noncholera vibrios or *V. parahaemolyticus* have subsequently been identified as *V. vulnificus* (3, 11, 16, 18). Other organisms reported as *V. parahaemolyticus* have not been tested for the Kanagawa reaction on Wagatsuma agar (7, 9, 10). To our knowledge, there has been only one clinical report of the isolation of a Kanagawa-negative *V. parahaemolyticus* strain from a wound and, in that report, the wound most likely was not infected when the culture was taken (14). At presentation, our patient had a

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developed abscess at the site of a puncture wound which had been incurred 3 days previously. Enrichment cultures are frequently required to recover *V. parahaemolyticus* from clinical specimens (8). However, direct plating of the abscess specimen resulted in moderate growth of *V. parahaemolyticus*, suggesting that a high count of *V. parahaemolyticus* was present in the abscess. This, coupled with the fact that only a few *K. pneumoniae* colonies were cultured, strongly suggests that the Kanagawa-negative *V. parahaemolyticus* was the primary pathogen. As in most other reported cases of extraintestinal infections with *V. parahaemolyticus*, the recovery of the patient was complete and uneventful (9, 10).

In addition to the wound infection being caused by a Kanagawa-negative *V. parahaemolyticus* strain, two other aspects of this case are noteworthy. First, this infection occurred in October, whereas *V. parahaemolyticus* infections most frequently occur in the summer in the mid-Atlantic or temperate regions (1). Seafood harvested during the summer can contain the organism, and clinical infection can result if the seafood is improperly processed or mishandled (2). Oysters, which are harvested from sediment and consumed during the cold months, may contain Kanagawa-negative *V. parahaemolyticus* strains similar to the strain which caused the infection in our patient.

Second, as has been reported by others (6, 13), the *V. parahaemolyticus* strain isolated from our patient could not be identified with the API 20E system. The API 20E system was designed for the identification of gram-negative enteric bacteria and has been shown to be reliable in that capacity (15). Misidentification of halophilic organisms with the API 20E system stems from the use of 0.85% NaCl as a diluent. When a 2% (wt/vol) marine salts (Instant Ocean; Aquarium Systems, Mentor, Ohio) diluent was substituted for the standard 0.85% NaCl diluent, halophiles were correctly identified (6).

In conclusion, this case report is intended to emphasize that halophilic vibrios should be considered when evaluating extraintestinal infections in a patient recently exposed to seafood or seawater. It should be emphasized further that infections can be caused by halophilic vibrios in cold as well as in warm months of the year.

This study was supported in part by the Veterans Administration.

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