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Non-O group 1 *Vibrio cholerae* Septicemia and Peritonitis
— Report of Two Cases —

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Two strains of non-O group 1 *Vibrio cholerae* (non-0:1 *V. cholerae*) were isolated from blood of a woman who had undergone a gastrectomy and from peritoneal fluid of a man with an impaired liver function. Microbiology laboratories in countries where raw fish and shellfish are frequently consumed should consider the possibility of non-0:1 *V. cholerae* when they identify vibrios from extraintestinal sources.

Key Words: Non-0:1 *V. cholerae*, septicemia, peritonitis.

Non-O group 1 *Vibrio cholerae* (non-0:1 *V. cholerae*) refers to the organism which is similar to epidemic cholera vibrio in cultural and biochemical characteristics, but it is not agglutinable to 0:1 antiserum (Baumann *et al.*, 1984). Contrary to 0:1 *V. cholerae* which causes enteric infection with very rare exception (Johnson *et al.*, 1983), non-0:1 *V. cholerae* causes both enteric and extraintestinal infections (Bäck *et al.*, 1974; Ferrington *et al.*, 1974; Prats *et al.*, 1975). Blake *et al.* (1980) cited only five isolations of this organism from blood and one isolation from peritoneal fluid indicating the rarity of such an infection.

We isolated non-0:1 *V. cholerae* from blood of a 53-year-old woman and from peritoneal fluid of a 42-year-old man. Clinical and bacteriological features of the two cases are presented.

CASE REPORTS

The first case was a 53-year-old woman (unit no. A1440994) who was admitted on August 27, 1984, with a 7-day history of generalized edema, lower extremity weakness, sensory change and diarrhea. In October, 1983, because of her stomach cancer, a subtotal gastrectomy was performed and adriamycin and 5-fluorouracil were started. Preoperative chemistry was normal in glucose and liver function. At admission, direct tenderness was noted on the right upper quadrant of the abdomen. Blood pressure was 110/70 mm Hg and body temperature was 36.2°C. Blood gas analysis showed a severe metabolic acidosis with respiratory compensation. Hematologic findings were leukocyte count 39,200/μl with 94% neutrophils, hematocrit 25% and platelet count 318,000/μl. Two blood cultures yielded gram-negative bacilli (84-8-6194) after 24-h incubation which were later identified as non-0:1 *V. cholerae*. Despite the administration of gentamicin and cefazolin, the patient's body temperature rose to 40°C on the second hospital day and her fingers and toes became cyanotic. She was discharged in grave condition and expired at home.

The second case was a 42-year-old man (unit no. 1576132) who was admitted on September 10, 1984, with abdominal pain of two days duration. He was a heavy drinker during the last 20 years and smoked a pack of cigarettes a day. He had frequent abdominal pains and abnormal live function tests. His present illness started with a sudden fever and chills, abdominal pain, vomiting and diarrhea which developed 12 hours after drinking. Because of dyspnea he visited a private clinic where a low systolic blood pressure of 60 mmHg was noted, and he was transferred to this hospital. At admission he had a distended abdomen with pain. Hematologic findings were leukocyte count 6,400/μl, hematocrit 27% and platelet count 7,000/μl. Fibrinogen was 135 mg/dl, fibrin degradation products 10 μg/ml and prothrombin time

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15.6 sec (44%). Amylase was 580 Somogy unit/dl, but lipase was normal. Peritoneal fluid was yellowish and cloudy with protein 2.2 g/dl and leukocyte count 17,800/μl. None of three blood cultures were positive, but the peritoneal fluid culture yielded light growth of gram-negative bacilli (84-9-2228) which were later identified as non-0:1 *V. cholerae*. Cephalexin and gentamicin were administered without effect. He was discharged on the second hospital day despite his grave condition and he died at home.

MATERIALS AND METHODS

Blood culture was done by inoculating 5-ml amounts to 50-ml bottles of tryptic soy broth (Difco) and Brewer thioglycollate medium (Difco). To detect growth, daily observations were made during the 7-day incubation at 35°C. Peritoneal fluid was inoculated onto blood agar and MacConkey agar plates and into thioglycollate medium. Identification of the isolates of gram-negative bacilli was done by conventional method (Wachsmuth *et al.*, 1980) and by API 20E system (Analytab Products, Plainview, N.Y.). Agglutination to 0:1 antiserum was done by slide method. Antimicrobial susceptibility was tested by the disk diffusion method (NCCLS, 1979).

RESULTS

The two isolates from both patients were slightly curved gram-negative bacilli. Colonies were large and hemolytic on blood agar, small and colorless on MacConkey agar, and yellow on Thiosulfate citrate bile sucrose (TCBS) agar. TSI reactions were acid slant and butt, negative gas and H_2S. Deoxyribonuclease and tween 80 hydrolysis tests were positive. Other

Table 1. Characteristics of non-0:1 *V. cholerae* isolates

Test	*V. vulnificus*[a]	*V. cholerae*[a]	Isolate no.:	
			84-8-6194	84-9-2228
TCBS	Green	Yellow	Yellow	Yellow
Oxidase	+[b]	+	+	+
Nitrate reduction	+	+	+	+
Indole	+	+	+	+
Voges-Proskauer	−	V	+	+
Simmons citrate		V	+	+
Urease	−	−	−	−
Gelatin hydrolysis	+	+	+	+
Growth at 0% NaCl	−	+	+	+
6% NaCl	+	−	−	−
Arginine dihydrolase	−	−	−	−
Lysine decarboxylase	+	+	+	+
Ornithine decarboxylase	V	+	+	+
ONPG	+	+	+	+
Gas from glucose	−	−	−	−
Acid from arabinose	−	−	−	−
cellobiose	+	V	+	+
glucose	+	+	+	+
inositol		−	−	−
lactose	+	+	+	+
mannitol	V	+	+	+
salicin	+	−	−	−
sucrose	−	+	+	+
Agglutination in 0 group 1 antiserum	−	+	−	−
API 20E code			5347124	5347124

[a] Adapted from Wachsmuth *et al.* (1980) and Baumann *et al.* (1984).

[b] +, positive or growth; −, negative or no growth; V, variable.

characteristics (Table 1) were compatible with those of *V. cholerae,* but not agglutinable to *V. cholerae* 0:1 antiserum. The first isolate was serovar 24. The isolates were susceptible to ampicillin, cephalothin, chloramphenicol, tetracycline, amikacin, gentamicin, kanamycin and tobramycin.

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DISCUSSION

In the past, vibrios other than those causing cholera were simply dismissed as nonagglutinable vibrios (NAGs) or as non-cholera vibrios (NCVs) (Blake *et al.,* 1980). When our two strains were isolated from blood and from peritoneal fluid, we at first suspected them as being *V. vulnificus* because it is a relatively common pathogen in Korea (Chong *et al.,* 1982; Goo *et al.,* 1982; Kim *et al.,* 1984). However, the isolates produced yellow colonies on TCBS agar, and grew at 0% NaCl but not at 6% NaCl broth. The isolates were differentiated from *Aeromonas hydrophila* by being positive lysine and ornithine decarboxylase and susceptible to ampicillin and cephalothin. The characteristics including positive Voges-Proskauer test were typically those of *V. cholerae,* and the same identification was made by API 20E system.

Like other vibrio infections, these infections occurred in summer. Although we failed to obtain the patients' eating histories, considering the fact that uncooked fish and shellfish dishes are often eaten at home and are usually served with drinks at restaurants in Korea, it was assumed that they ate such food. Extraintestinal vibrio infections are mostly found in patients with underlying diseases (Blake *et al.,* 1980). Both of the patients had a defective antibacterial defense; namely, gastrectomy in the first patient and impaired liver function in the second. The clinical features of the first patient were not different from an ordinary septicemia. Except for the absence of skin lesion, the features of the second patient, such as abdominal pain, hypotension and intravascular coagulation, were very similar to those seen in *V. vulnificus* infection. A careful microbiological study may establish the differential diagnosis of various extraintestinal vibrio infections. Both of the patients expired. Like *V. vulnificus* septicemia (Blake *et al.,* 1980), non-0:1 *V. cholerae* extraintestinal infection seems to be highly fatal. Hughes *et al.* (1978) reported a fatality rate of 44%.

In conclusion, non-0:1 *V. cholerae* may cause highly fatal extraintestinal infection if a compromised patient eats raw fish or raw oysters in summer. Such infection may be more prevalent in countries where eating uncooked fish and shellfish is rather frequent. Clinical microbiology laboratories should be prepared to detect and correctly identify this organism in order to establish the etiology and to provide better patient care.

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