

# FATAL SEPTICAEMIA CAUSED BY VIBRIO VULNIFICUS

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## SYNOPSIS

Two classical cases of *Vibrio vulnificus* septicaemia were reported in Singapore. The patients were middle-aged Chinese males with underlying liver disease. Both were very ill on admission and died soon after. *V. vulnificus* was isolated from the blood of one patient and the blood and wound of the other. The vibrio strains were identical culturally and biochemically, and sensitive to the antibiotics routinely used.

SING MED J. 1988; 29:176-178

## INTRODUCTION

Some members of the Family *Vibrio* are well-known human pathogens, most of which cause severe diarrhoea but a few species may be found in extra-intestinal infections (1). Recently, the pathogenic potential of *Vibrio vulnificus* for humans has been recognized and its isolation in S'pore were reported(2). Unlike the common vibrios, *V. vulnificus* seldom causes diarrhoea and is rarely found in stools. The isolations of this lactose-positive vibrio from the blood, CSF and wounds were first reported by Weaver et al. in 1975(3) and Hollis et al. in 1976(4).

In this paper, we report the first two cases of fatal septicaemia caused by *V. vulnificus* in Singapore, and the laboratory findings of the strains.

### Case report 1

On 29.12.85, a 58 year-old Chinese male was admitted with a one day history of high fever and vomiting. He had a past history of liver cirrhosis with oesophageal

varices treated by a general practitioner.

On admission, the patient was very ill, toxic and dehydrated. His temperature was 38.5°C, BP 110/60, pulse 88/min, respiration 20/min. He was jaundiced and had spider naevi on his chest and palmar erythema. There was pitting oedema up to his knees. His abdomen was distended with ascites but was soft and non-tender. The liver was palpable 2 cm. below the right subcostal margin. He was drowsy but there was no flap. The heart and lung were clear.

Peritoneal tap was done and Gram stain of the peritoneal fluid showed the presence of polymorphs and Gram-negative bacilli. Two blood specimens were taken on 30.12.85 and cultured for bacterial pathogens.

He was diagnosed to have Gram-negative septicaemia with peritonitis and liver cirrhosis. Despite intravenous ampicillin and gentamicin, he deteriorated and died 12 hours after admission.

### Case report 2

A 66 year-old Chinese male was admitted on 21.01.86 for complaints of fever, chills and general 'unwellness' for 3 days. He had a history of diabetes mellitus since 1983 and alcoholic liver disease since 1984.

Clinical examination revealed an ill, febrile (39°C) and breathless patient. The BP was 60/40 and he had features of chronic liver stigmata but was anicteric. The left leg was warm, erythematous, swollen and tender. He was treated as for left leg cellulitis with septicaemic shock with intravenous rocephine, cloxacillin and hydrocortisone.

Haemorrhagic bullae developed over the left leg area a few hours after admission and progressed rapidly to a haemorrhagic gangrene the next day. The right leg was noted to have areas of ischaemia as well. X-ray of the legs revealed no free gas within. The patient remained hypotensive and oliguric despite intravenous dopamine support. Bilateral above-knee amputation was performed on 23.01.86. Post-operatively, he remained ill and deteriorated over the next few days and died.

Two blood specimens and a wound swab from the left leg were taken on 22.01.86 and cultured for bacterial pathogens.

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## MATERIAL AND METHODS

### Culture and sensitivity

Blood: Blood specimens were cultured in brain heart infusion broth containing 0.05% liquid. After overnight incubation at 37°C, the broth cultures were plated on blood and eosin methylene blue (EMB) agar. Pure cultures of vibrio-like colonies produced, were identified with a range of biochemical tests (Table 1). Antibiotic sensitivity was determined by the method of Bauer et al.(5) on Mueller-Hinton agar

Table 1  
**Vibrio vulnificus Strains Isolated  
 from Blood of Patients  
 (Case 1&2) with  
 Identical Biochemical Reactions**

Indole	+
Methyl red	-
Voges Proskauer (Barritt's)	-
Citrate (Simmons)	+
Decarboxylation (Moeller):	
Lysine	+
Arginine	-
Ornithine	-
Fermentation:	
Glucose	Acid
Lactose	+
Sucrose	-
Maltose	+
Mannitol	+
B-galactosidase production	+
Oxidase	+
Motility	+
Hydrogen Sulphide	-
Nitrate reduction	+
Urease	-
O/129 sensitivity	+
Salt tolerance:	
0%	-
3%	+
7%	-
11%	-
Kanagawa phenomenon	+
Haemolysis	+

**NB** Except for salt tolerance test, all media used in the biochemical tests contained 1% NaCl.

against BBL Sensi-Discs.

Wound: A wound swab taken from the patient's left leg was streaked on blood and EMB agar, and then kept in cooked meat medium. After overnight incubation at 37°C, colonies resembling those of the blood cultures were produced and identified biochemically, and antibiotic sensitivity testing done as above.

## RESULTS

Results of the biochemical and antibiotic sensitivity tests on all the vibrio-like organisms were identical. The organisms were identified as *V. vulnificus* and were sensitive to chloramphenicol, ampicillin, tetracycline, co-trimoxazole, neomycin, sulphonamide, gentamicin, carbenicillin, cephalothin, nalidixic acid and polymyxin B (50 & 300 IU), and resistant to kanamycin and streptomycin.

## DISCUSSION

Two classical cases of *V. vulnificus* septicaemia have been described. Both patients had underlying liver disease. One patient had in addition, diabetes mellitus and developed interesting skin lesions, a presentation which had also been reported by other workers(6). Despite the usual aggressive treatment as for Gram-negative septicaemia, the patients died. Neither one was given tetracycline. Unfortunately, a history of seafood consumption was not noted for both cases.

In 1979, Blake et al.(6) studied the clinical and epidemiological characteristics of the vibrio and concluded that the infections formed two distinctly different clinical groups:

**Primary septicaemia** in persons with underlying diseases (especially of the liver) after consumption of raw or partially-cooked seafood contaminated with the highly virulent vibrio. Mortality rate was high (50%) and death usually occurred within 16 hours. Secondary skin lesions, in the form of large bullae often appeared on the arms and legs, and necrotic ulcers subsequently developed.

**Wound infections** in apparently healthy persons who had been exposed to sea-water or marine environment. Incubation period was 4 to 48 hours. The wounds were usually minor, but in some cases, they progressed rapidly to cellulitis, with bullae appearing and becoming necrotic.

Reports had indicated that most of the cases occurred during the warm summer months when there was an increase of water sports and bacterial growth in the coastal waters. Although the susceptibility of patients with hepatic disease to *V. vulnificus* infections is unclear, Almdal et al.(7) suggested that various abnormalities developed in the immune system might have increased the chances of bacterial infections in these patients. Johnston et al.(8) also found a close association between development of septicaemia and several risk factors, including liver disease, blood disorders, chronic renal failure, alcoholism and the use of immunosuppressive drugs. Clinicians should notify the laboratory of such cases, so that appropriate culture technique would be used for isolation of the vibrio.

Culturally, *V. vulnificus* resembles *Vibrio parahaemolyticus* on blood agar and thiosulphate citrate bile salts sucrose (TCBS) media, but differs biochemically in lactose fermentation, β-galactosidase production and low salt tolerance, and in-vitro sensitivity to ampicillin as over 80% of local *V. parahaemolyticus* strains have been found resistant to ampicillin(9). The 'Kanagawa phenomenon', which is used for testing the enteropathogenicity of clinical

and environmental *V. parahaemolyticus* strains(10), is positive for all *V. vulnificus* strains isolated from clinical as well as environmental sources(11). The abovementioned haemolysin test, therefore, is unsuitable for determining the pathogenicity of *V. vulnificus*.

Raw or undercooked seafood is a common source of *V. vulnificus* infection via the gastrointestinal tract. The vibrio can also enter via broken skin. Hence, patients belonging to the high-risk group should be warned of the danger of eating contaminated seafood or exposure to marine environment. Treatment with antibiotics should be instituted promptly as half the patients die, often one or two days after the infec-

tion(6). Although *V. vulnificus* strains are generally sensitive to the antibiotics routinely used, tetracycline is recommended because it has been shown to be effective in treating animals experimentally infected with *V. vulnificus*(12) and in in-vitro sensitivity tests using agar diffusion method(4,13,14).

#### ACKNOWLEDGEMENTS

We wish to thank Dr. JJ Farmer III, Centers for Disease Control, Atlanta, for confirming the *V. vulnificus* strains, and Wan Siew Hoon and Goh Heow Hong for excellent technical help.

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