Non-O:1 *Vibrio Cholerae* Bacteremia: Report of Two Cases

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Introduction

Non-O:1 *Vibrio cholerae* which is known as nonagglutinable *Vibrio*, are organisms which are biochemically and morphologically indistinguishable from O:1 *Vibrio cholerae* but do not agglutinate in O:1 *Vibrio* antiserum¹⁾. In contrast to classic *Vibrio cholerae* which rarely causes infection outside the gastrointestinal tract, otherwise the non-O:1 *Vibrio cholerae* not only causes a spectrum of gastrointestinal illness ranging from mild watery diarrhea to febrile, bloody diarrhea, but also causes a significant percentage of infection outside the gastrointestinal tract^{2,3)}. Previous reports have documented isolation of microorganism from biliary tract^{3,4)}, wound^{3,5)}, peritoneal fluid^{3,6)}, cerebrospinal fluid^{3,7,8)}, sputum³⁾ and rarely in the blood²⁾. To our knowledge, there are only 17 cases of non-O:1 *Vibrio cholerae* bacteremia have been reported in the English-language literature and here we reported two cases.

Case One

A 43-year-old man with a one year history of liver cirrhosis was admitted with general malaise, abdominal fullness, fever and chilliness for one day. Because hypotension with consciousness disturbance and severe metabolic acidosis occurred in the emergency room, he was transferred to intensive care unit after cardiopulmonary resuscitation. His body temperature was 38.5°C; blood pressure, 70/40 mmHg; pulse rate, 120 beats/min; respiratory rate 35/min. Physical examination were notable with drowsy consciousness and condition of intubation, mild icteric sclera, distended and diffuse tender abdomen, palmar erythema and pitting edema. There are no abnormal cardiopulmonary findings. A complete blood analysis showed a white blood cell count of 22100/mm³ with severe shift to the left (42% band, 19% metamyelocyte, 6% myelocyte), a hemoglobin level of 13.8 gm/dL, a hematocrit of 43.7%. The platelet count was 55000/mm³, the prothrombin time and partial thromboplastin time prolonged for two times of normal control value. The blood urea nitrogen was 16 mg/dL and serum creatinin was 1.2 mg/dL. The serum albumin and globulin were 2.5 g/dL and 3.3 g/dL respectively. The serum level of alanine aminotransferase and aspartate aminotransferase were 202 IU/L and 102 IU/L. The level of serum total and direct bilirubin were 2.76 and 1.78 mg/dL. The serum ammonia level was 0.185 mg/dL (0.02—0.05) mg/dL. Abdominal sonogram showed a small size and uneven surface liver with massive ascites. Splenomegaly was also noted. Ascites was aspirated for routine examination showed yellowish and turbid appearance with total white cell count of 2500/dl and L/N ratio was 50/50. Two sets of blood culture grew non-O:1 *Vibrio cholerae* but no organism

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grew from ascites. The bacteria is sensitive to chloramphenicol, tetracycline, gentamicin, tobramycin, amikacin, cephalthrin, cefamandol, cefoxitin, ceftriaxone, ceftazidime and cefotaxime. The patient expired on the second hospitalized day despite the administration of cefotaxime and amikacin. The patient had no records of prodromal or concurrent diarrheal illness. He had not eaten raw shellfish nor was there exposure to seawater before the admission.

Case Two

A 55-year-old man with a one year history of postnecrotic liver cirrhosis and had been admitted to our hospital for six times due to frequent hepatic encephalopathy and upper gastrointestinal bleeding. This was his seventh admission due to consciousness disturbance and tarry stool for one day. His body temperature was 37.7°C; blood pressure, 100/60 mmHg; pulse rate, 94 beats/min; His consciousness was irritable and disoriented. The conjunctiva was pale and sclera was icteric. There were no abnormal cardiopulmonary findings. The complete blood cell count showed a white blood cell count of 5300/mm³ with 60% segmented form, a hemoglobin level of 6.2 gm/dL, a hematocrit of 19.2%. The platelet count was 89000/mm³. The prothrombin time and partial thromboplastin time prolonged two times the normal control value. The blood urea nitrogen was 18 mg/dL and serum creatinin was 2.3 mg/dL. The serum level of alanine aminotransferase and aspartate aminotransferase were 56 IU/L and 14 IU/L. The level of total and direct bilirubin was 4.3 and 2.5 mg/dL. The serum albumin and globulin level were 2.4 and 3 g/dL. The serum ammonia was 0.22 mg/dL (0.02–0.05 mg/dL). One set of blood culture grew non-O:1 *Vibrio cholerae* with the same sensitivity test as case one. There was no organism grown from ascites or stool. He was managed by blood transfusion and oral latulose and neomycin due to gastrointestinal bleeding and hepatic encephalopathy. Cephalothrin and gentamicin were prescribed due to positive blood culture and continued for one week. He was discharged after admission for 16 days.

Discussion

Non-O:1 *Vibrio cholerae* was differentiated from O:1 *Vibrio cholerae* by Gardner *et al.* in 1935 because the organism was unable to agglutinate in O:1 group anti-serum¹⁾. These organisms have caused outbreaks and sporadic cases of gastrointestinal illness with symptoms of watery diarrhea, vomiting, abdominal pain, fever and muscle cramps. The incidence progressively increased since 1972 and is associated with shellfish ingestion or salt water exposure³⁾. The average duration of diarrhea was about 5–7 days and sometimes patients need hospitalization for fluid and electrolytes supplement.

In addition to cause acute diarrheal illness, the organism also induced extraintestinal disease. The organism can cause biliary tract infection^{3,4)}, cellulitis of skin³⁾, acute otitis media³⁾, pneumoniae³⁾, acute appendicitis³⁾, meningitis^{7,8)} and rarely bacteremia²⁾.

Shardon *et al.* reported a case of non-O:1 *Vibrio cholerae* bacteremia associated with prostatic abscess in aplastic anemia patient and reviewed the literatures²⁾. There are only 13 reports (16 cases) of non-O:1 *Vibrio cholerae* bacteremia had been published in English-language literatures. In addition the case of Sharon and two cases of our presentation, there are 19 cases of non-O:1 group bacteremia (Table 1). 47% (9/19) of these patients were liver cirrhosis and total mortality rate was 52% (10/19). Nearly all the patients were immunocompromised and liver cirrhosis is an important risk factor.

The pathogenesis of this bacteremia is still unknown. Bacterial products such like cholera-like enterotoxin and E1 Tor hemolysin may play a role in these disease process. Host susceptibility is potentially important and this organism can function as an opportunistic pathogen²⁾. A decrease in the classic pathway of complement or alternation in transferrin saturation may account for the increase susceptibility of patient with liver cirrhosis¹⁶⁾. Because of the low attention and high mortality rate of

Table 1 Summary of non-O:1 *Vibrio cholerae* bacteremia from English literature

Case no./ year (reference)	Age	Underlying disease	Outcome	Comments
1/1974 (8)	64 y	liver cirrhosis	died	cellulitis, CSF culture(+)
2/1975 (15)	49 y	liver cirrhosis	survived	—
3/1977 (16)	6 y	kwashiorkor	—	—
4/1978 (3)	72 y	AML	died	pneumonia, polymicrobial sepsis
5/1978 (3)	56 y	liver cirrhosis	died	Gram (—) sepsis
6/1980 (18)	64 y	chronic renal failure	died	urine culture(+) liver abscess culture(+)
7/1980 (18)	67 y	CLL	survived	sinusitis(staphylococcus aureus)
8/1981 (7)	3 w	none	survived	ventriculitis, CSF culture(+)
9/1982 (11)	75 y	cholelithiasis	survived	stool culture(+)
10/1982 (14)	51 y	CLL	died	pneumonia sputum culture(+)
11/1983 (13)	58 y	liver cirrhosis	died	coma
12/1983 (13)	46 y	liver cirrhosis	died	—
13/1985 (19)	6 w	none	survived	pneumonia, cerebral abscess
14/1986 (6)	51 y	liver cirrhosis cholelithiasis	died	ascites culture(+)
15/1988 (2)	63 y	aplastic anemia	survived	prostate abscess
16/1989 (20)	50 y	liver cirrhosis	died	—
17/1989 (20)	31 y	liver cirrhosis	survived	—

AML: Acute Myelocytic leukemia CLL: Chronic Lymphocytic leukemia

non-O:1 *Vibrio cholerae* bacteremia, we reported two cases of liver cirrhosis associated with non-O:1 group bactremia. One was admitted with septic shock and expired two days later. The other was admitted with hepatic encephalopathy. Bacteremia was noted incidentally from routine blood culture. He was asymptomatic and discharged after recovery from hepatic encephalopathy. Both patients did not have records of sea food ingestion or exposure to salt water before this admission. Moreover, no gastrointestinal manifestations could be found except gastrointestinal bleeding due to liver cirrhosis in the case two. Because no definite infection foci could be indentified, these two cases appeared to be primary bacteremia with a fulminant course in case one. More case reports are needed for further clinical and epidermiological evaluation.

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Non-O:1 ビブリオ・コレラ菌血症—2 症例報告

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英文文献においての Non-O:1 ビブリオ・コレラによる腸管外感染の報告は稀である。我々が調べた限り、今までは17例しか報告されていなかった。そのほとんどの症例は免疫不全宿主による日和見感染であった。我々は Non-O:1 ビブリオ・コレラ菌血症を伴った肝硬変の2症例を経験し、報告する。症例1は敗血症ショックにて入院。血

培より Non-O:1 ビブリオ・コレラを検出し、入院2日後死亡した。症例2は肝性脳症にて入院。血培よりビブリオ・コレラを検出した。この症例は抗菌剤で除菌に成功し、入院16日後退院となった。

肝硬変における Non-O:1 ビブリオ・コレラ菌血症の病態生理はなお不明であり、今後、症例を重ねて、解明していく必要があると思われる。