Septicaemia secondary to *Vibrio vulnificus* cellulitis

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Abstract

***Vibrio vulnificus* is a naturally occurring, salt-water bacteria found in estuarine and coastal waters worldwide. It prefers low salinity and warm water temperatures for optimum growth. Infection from *Vibrio vulnificus* is uncommon, although it has been reported from many locations (e.g. southern United States of America, Israel, Republic of Korea, Japan, Taiwan, Spain, Turkey). It can be serious and life threatening, causing septicaemia and wound infections. This paper reports a case of septicaemia secondary to *Vibrio vulnificus* cellulitis in an elderly woman. The infection was acquired after wading in a coastal lagoon with a pre-existing superficial leg wound. *Commun Dis Intell* 2005;29:305–307.**

Keywords: Vibrio vulnificus, wound infection, water-borne infection, secondary septicaemia

Introduction

Vibrio vulnificus is a gram-negative bacillus and part of normal marine flora in estuarine and coastal waters worldwide.[1] It has been isolated in waters of low to moderate salinity i.e. 5–25 parts per thousands (ppt)[2,3] and in water temperatures of 9–31º C. *Vibrio vulnificus* is also found in sediment, and filter feeding shellfish such as oysters, mussels, clams, and scallops, and fish that inhabit coastal oyster reefs.[4]

V. vulnificus illness has been reported worldwide and usually occurs in the warmer months. Gastroenteritis associated with ingestion of uncooked seafood (particularly oysters) contaminated with *V. vulnificus* is rarely reported. However, primary septicaemia may occur in those with chronic liver disease, haemochromatosis, or immune disorders. The case fatality rate is 50 per cent, increasing to 90 per cent in those with hypotension.[1] This clinical syndrome includes fever, chills, hypotension, shock, and metastatic necrotizing cutaneous lesions. Thrombocytopaenia and disseminated intravascular coagulation are common complications. In otherwise healthy people, exposure of superficial wounds to water where the organism is present can result in local wound infection that may progress to cellulitis, necrotizing fasciitis and secondary septicaemia.[1,5] The case fatality rate ranges from 20–30 per cent for *V. vulnificus* wound infections.[4]

Case report

An 83-year-old female had been wading in a coastal lagoon with a pre-existing abrasion on her left lower leg. Two days later she presented to her general practitioner with fever (axillary temperature 39.6° C), low abdominal pain, and extreme pain in her left lower leg. The area of abrasion had a motley dark appearance. She was subsequently referred to hospital. Prior to this illness the patient was well, active and independent with no major health issues other than asthma, for which she used a Budesonide inhaler. She had no known history of liver disease or immunosuppression. She did not eat any fresh oysters or seafood leading up to her illness.

On admission to the emergency department the patient was febrile, with a history of rigors, nausea, vomiting, malaise and abdominal pain. She was alert, orientated, and normotensive. Initial treatment for cellulitis included intravenous fluids, penicillin, flucloxicillin, and analgesia. Biochemistry and haematology results were normal (white cell count 10.7 x 10^9/L; normal range 4.0 – 11.0 x 10^9/L) except for neutrophil count 9.6 x 10^9/L (2.0 – 8.0 x 10^9/L); lymphocytes 0.1 x 10^9/L (1.0 – 4.0 x 10^9/L); monocytes 0.9 x 10^9/L (0.2 – 0.8 x 10^9/L) and C-reactive protein 8.5 mg/L (< 5.0 mg/L).

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The following morning the patient's condition deteriorated to septic shock and acute renal failure, requiring intensive care admission and inotropic support. She was profoundly hypotensive, tachycardic and oliguric, despite overnight administration of intravenous fluids and frusemide. Her left calf was warm, swollen and erythematous. Abnormal biochemistry and haematology at this time included: urea 10.6 mmol/L (2.5–6.4 mmol/L); creatinine 0.24 mmol/L (0.06–0.12 mmol/L); bicarbonate 14 mmol/L (21–31 mmol/L); protein 55 g/L (64–82 g/L); albumin 25 g/L (34–50 g/L); alkaline phosphatase 37 IU/L (50–136 IU/L); white cell count 11.1 x 10^9/L; neutrophils 8.2 x 10^9/L; troponin 0.22 ng/mL (0.0–0.05 ng/mL). Coagulation studies were also slightly raised; prothrombin time 20 seconds (normal range; 9–13 seconds); activated partial thromboplastin time; 36 seconds (25–35 seconds); International normalised ratio (INR) 1.8 ratio (1.0–1.3). Hypoxaemia and metabolic acidosis had also developed, and subsequent pathology results deteriorated further. Penicillin was ceased; ceftriaxone and gentamycin added. Debridement of the patient's leg wound was performed on days 2 and 3, after which she required inotropic and ventilatory support for several days.

The patient's antibiotic regime was reviewed as microbiology results emerged. Methicillin-resistant staphylococcus (not an endemic hospital strain) and gram-negative bacilli were cultured from the wound site requiring a change from flucloxicillin to vancomycin. *V. vulnificus* was later identified from admission blood cultures and gentamycin was then swapped for doxycycline.

Her renal function and haemodynamic status gradually improved, and a split skin graft was performed on day 17. The following day she was transferred to a ward. Wound swabs were clear and antibiotics were ceased. Four weeks after admission she was transferred to a private hospital where she continued to convalesce with very restricted mobility. She was eventually discharged after six weeks hospitalisation.

Environmental investigation

The lagoon where the patient went wading (lagoon 1) is one of three distinct coastal lagoons, and is separated from the ocean by a sandbar. Water samples were taken from each of the lagoons and adjacent beaches for bacterial analysis and salinity testing (Table). *V. vulnificus* was isolated from two lagoons, but was not detected in any of the beach samples. All of the beach samples revealed a salinity level of 36.1 parts per thousand (ppt), normal for seawater. Water temperatures recorded for lagoon one fluctuated between 24–28º C at the time of the patient's exposure.

Other *Vibrio* infections

The patient's general practitioner also diagnosed a number of other otitis externa infections around the same time. It is possible that these infections were as a result of swimming in the same lagoon. In one case, *Vibrio* species was cultured from a swab taken (species not identified) when a 14-year-old male presented with an ear infection. Treatment with Augmentin forté and Ciproxin ear drops resulted in a complete recovery.

Communicable disease control significance

This case study highlights the need to consider *V. vulnificus* infection in a differential diagnosis for wound infection, particularly when recreational water activities coincide with growth of the bacteria during the summer months. *V. vulnificus* infection is also potentially life-threatening for people with pre-existing liver disease and immune disorders. This group may benefit from preventative advice regarding consumption of raw seafood and contact with seawater in the summer months. Rapid progression and severity of disease makes early diagnosis and treatment of *V. vulnificus* infection crucial for a positive outcome. This infection is not consistently

Table. Chemical and microbiological analysis

Lagoon source	Salinity (parts per thousand)	Sampling point	Faecal coliforms (per 100 ml)	*Escherichia coli* (per 100 ml)	*Vibrio vulnificus* (per 200 ml)
*1	12.6	shallow	24	24	not detected
		deep	22	18	detected
2	16.8	shallow	150	150	detected
		deep	180	180	detected
3	18.2	shallow	96	96	not detected
		deep	8	8	not detected

Source: NSW Health – Division of Analytical Laboratories.

* Patient's wading lagoon.

susceptible to aminoglycosides as are other more common aerobic gram-negative bacilli.[5] Appropriate antimicrobials include doxycycline, cefotaxime, ceftriaxone, ciprofloxacin or minocycline if *V. vulnificus* infection is suspected.[6]

The environmental investigation confirmed the presence of *V. vulnificus* in local recreational waters with low salinity. It is likely that this bacterium is present during most summers with high water temperatures. It is difficult to quantify the health risk posed by these findings. There is no specific ICD –10 code (International Classification of Diseases – 10th Revision) to allow rapid searching of health databases (in-patient statistics; mortality data). Our local pathology provider upgraded their information system three years ago; there were no other isolates of *V. vulnificus* in the last three years. Intensive care clinical staff recalled a similar case about 10 years ago. It is equally challenging to communicate a life threatening health risk that is a rare event to a local community that generates income and pleasure from its environment.

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