Extensive Cellulitis with Septic Shock Caused by *Vibrio vulnificus* Infection—A Case Report with Review of Literatures—

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**Introduction**

*Vibrio vulnificus* infection was first characterized by Roland in 1970 of a case with endotoxic shock syndrome and a leg gangrene acquired in the New England coastal water. However, it was misinterpreted as *Vibrio parahemolyticus* at that time. This organism causes two distinct clinical syndromes in infected persons: Primary septicemia and wound infection, both associated with high mortality. *Vibrio vulnificus* infection is not rare in the Southwestern coast of Taiwan in our own experience. Here we report a “characteristic” victim with extensive cellulitis and septic shock caused by *Vibrio vulnificus* infection, who was successfully resuscitated by early recognition, appropriate antibiotics and prompt surgical intervention.

**Case Report**

A 77-year-old male, native of Taiwan, with a history of gouty arthritis for over 10 years, was in stable general medical condition. No history of liver disease was ever mentioned. Just 1 day before admission, he went to work in his own fishpond (seawater) in the morning with a pre-existing abrasion wound over his left hand. Fever, chills, with painful swelling of left hand and forearm developed 10 hours later. He was brought to our emergency service the next morning. On admission, his left-hand and forearm showed reddish swelling with marked tenderness and some small vesicles. Only hours later those small vesicles rapidly evolved into several large hemorrhagic bullae. Cellulitis was suspected in the emergency service, with intravenous crystalline penicillin given. Profound shock with conscious disturbance developed 12 hours after admission so he was admitted to our intensive care unit on the second day. In our ICU *Vibrio vulnificus* infection was suspected by the clinical presentation and the history of contact with sea water. Antibiotics was then changed to chloramphenicol 1 gm intravenously per 6 hours. Initial hemogram showed leukocytosis with WBC; 30, 100/cumm, with metamyelocyte: 1.5%, band-form: 24% and segment neutrophil: 71.5%, hemoglobin: 14.9 mg/dL, platelet count: 168,000/cumm. Impaired renal function was noted with serum BUN: 52 mg/dL, and serum creatinine: 3.5 mg/dL. Other biochemical data were all within normal limits, except serum uric acid: 11.1 mg/dL. Blood culture yielded *V. vulnificus*, but culture of
aspirated fluid from bullae yielded no growth of bacteria. Although his consciousness became clear and blood pressure was stable on the third day of hospitalization. Extensive necrosis of left hand was still noted. Left below-elbow amputation was performed by orthopedist on the fourth day of admission. The post-operative recovery was quite smooth and he was discharged 6 weeks later under stable condition.

Histopathology of left forearm showed extensive suppurative inflammation throughout the epidermis, dermis and subcutaneous tissue. Masses of neutrophils and eosinophils were also noted. Besides, fibrinoid necrosis of the fibrous tissue was seen in the upper dermis. The underlying fascia and muscle was largely intact. The whole picture was compactable with cellulitis over skin and subcutis.

Discussion

*V. vulnificus* is a relatively new addition to the list of bacteria known to cause serious diseases in human. Reports of infection with this organism can be found in recent medical literatures\(^2\), \(^3\). However, such infection may have long existed since the ancient time\(^5\). According to our own experience, *V. vulnificus* infection is not rare in the southwestern coastal area of Taiwan\(^4\).

*V. vulnificus* infection has two classical clinical presentations: 1. Primary septicemia: in such case, *V. vulnificus* is acquired through gastrointestinal tract after ingestion of shellfish contaminated by this organism. 2. Wound infection: which is associated with exposure of wounds to seawater or injuries by shellfish\(^6\). Wound infection due to *V. vulnificus* may be mild and self-limited, or may progress to severe cellulitis, necrotising fasciitis and myositis, which requires extensive debridement, or amputation\(^7\), \(^8\), like what our case presents. Incubation period of *V. vulnificus* infection is short, symptoms mostly appear within 16 hours after exposure. And the mortality is extremely high, with overall mortality around 38% to 46%. In those patients who develop hypotension within 12 hours of admission, the mortality rate can reach 90%\(^2\), \(^6\). Except for the above two clinical presentations, cases of other *V. vulnificus* infections such as gastroenteritis, pneumonia, meningitis and endometritis have also been reported sporadically\(^9\), \(^10\), \(^11\), \(^12\).

*V. vulnificus* is a pleomorphic, asporogenous Gram-negative rod which classically has a single rigid curve, and is motile by means of a single polar flagellum. *V. vulnificus* can ferment lactose, a distinctive characteristic that is responsible for its prior designation as the “lactose-positive *Vibrio*”\(^13\).

This bacteria is part of the normal bacterial flora over the coastal areas of United States, including both the western and eastern coasts. It can also be found in shellfish. There is marked seasonal variation in the occurrence of *V. vulnificus* in seawater, with peak in late summer and disappearance in the winter\(^14\). The seasonality correlated closely with the occurrence of human *V. vulnificus* infections. As our own experience showed, all the patients were admitted during May to November. Epidemiologic studies have shown a very strong association between *V. vulnificus* primary septicemia with various chronic diseases, the most important one is, liver cirrhosis. In the other hand, host factors do not play as great a role in the initial susceptibility to *V. vulnificus* wound infections. However, they do influence the severity of infection. Deaths associated with wound infections have occurred almost exclusively among persons who are in some way immunocompromised, or who are under such conditions as hemochromatosis or liver cirrhosis. The striking association between liver cirrhosis and *V. vulnificus* infection is probably related to: 1. Increase levels of iron available in cirrhotic patients\(^15\). 2. Patients with cirrhosis may also have problems with opsonization and deficiencies in neutrophil and macrophage function, as well as impaired alternative pathway function of complement fixation\(^16\).

Initial clinical presentations of *V. vulnificus* infection range from profound shock status to only mild local wound tenderness. Fever, chills, and headache are common. Tachycardia and hypotension are the first clue which lead to impending shock. The most striking clinical manifestations are skin lesions.
Typical skin change is described as follows: Initially only local tenderness is noted, followed by erythema and edema, producing indurated plaques. The plaques soon evolve with suffusion to cover area of blue-purple discoloration, vesicles, and hemorrhagic bullae. Eventually the skin undergoes necrosis with sloughs formed, leaving large ulcers that extend through subcutaneous fat. Gangrene of a limb may develop as a result of major vessel occlusion. Necrotising fasciitis and myositis are the most serious type of local wound infections. Under such conditions extensive surgical debridement is always needed. Histopathological study of the skin lesions shows inflammation with necrosis of subcutaneous tissue, with numerous neutrophils and bacteria surrounding the adjacent dermis and muscle layers. Intensive inflammation is also noted around the blood vessels, probably due to massive bacterial invasion. Vessel lumina may become impacted with leukocytes, leading to vascular occlusion. Numerous Gram-negative coccobacillary organisms can be found in the base of bullae, as well as at the dermal-epidermal interface. While the lack of inflammation in the bullae fluid or in the base of bullae is striking in spite of serious skin infection.

Early recognition, prompt antibiotic treatment, and aggressive surgical removal of necrotic tissue remain the cornerstone for saving lives from this rare, but serious, often fatal infection. Additional measures to combat cardiovascular collapse, adult respiratory distress syndrome, and other consequences of septicemia and shock are also essential. About antibiotics, in vitro this organism is usually sensitive to all antimicrobial agents commonly used in the initial empirical treatment of sepsis or severe wound infections. However, in animal experiments, tetracycline appears to be the drug of choice.

References

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Vibrio vulnificus Septicemia with Extensive Cellulitis

Vibrio vulnificus敗血症ショック

—症例報告および文献の回顧—

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Vibrio vulnificus は偶々重症敗血症を起す好塩性の海洋細菌である。我々は広範囲の蜂窩繊炎を
伴なった敗血症の1症例を報告する。症例は77歳
の男性、海水の漁池で仕事をする時に感染を受け、
24時間後、敗血性ショックにて入院となった。入
院後、抗生物質および截肢手術にて救命された。
我々は症例報告と共に文献を回顧し、この病気
における病因、臨床所見および治療について検討し
た。

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