

# Fulminant Wound Infections due to *Vibrio vulnificus*

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Vibrios are natural inhabitants of the marine environment. Transmission of vibrio infections is primarily through the consumption of raw or uncooked shellfish or exposure of wounds to warm seawater [1]. Pathogenic vibrios cause three major clinical syndromes: gastroenteritis, wound infections, and primary bacteremia, the latter being acquired through ingestion of the organisms through the gastrointestinal tract. *Vibrio vulnificus* is the most important pathogenic vibrio in the United States because of its invasiveness and the high fatality rates associated with infection. Indeed, this organism is considered the leading cause of seafood-associated deaths in the U.S. [1]. Exceedingly rare before 1995, *V. vulnificus* has since become an emerging pathogen in Israel. Bisharat et al. [2] recently reported the clinical and epidemiological features of a major and ongoing outbreak of wound infection and

bacteremia caused by a new strain of *V. vulnificus* in Israel. In contrast to previously published data, cases in Israel occur almost exclusively among people handling the *Tilapia* spp. fish (popularly known in Israel as St. Peter's fish) that is grown in fresh water fishponds. In addition, no deaths have been reported. A new marketing policy introduced in January 1998 requires that fish be sold only after being cleaned and refrigerated. This policy reduced but did not completely eradicate the morbidity of the disease. As many new cases continue to occur, we report the first two fatal cases associated with *V. vulnificus* wound infection in Israel. Preliminary identification of *V. vulnificus* in these cases was done by isolation of gram-negative rods growing as large pigmented colonies on blood agar and on thiosulphate-citrate-bile-salts-sucrose agar, but not on MacConkey agar. Final identification was performed by the reference Central Laboratories of the Ministry of Health, Jerusalem. Isolates were susceptible to all antibiotics

used in the standard disk susceptibility test.

## Patient Descriptions

### Case 1

In September 1999 a 71 year old woman arrived at the emergency room with complaints of severe pain in the left hand. The patient denied having been injured while handling a *Tilapia* fish 36 hours earlier. Past medical history was unremarkable. On admission, the patient was alert with a temperature of 39.4°C; blood pressure was 80/60 mmHg and pulse 130 beats per minute. The left hand was markedly swollen and the fingertips were cyanotic. Laboratory results were unremarkable, except for findings compatible with severe metabolic acidosis and coagulopathy. The patient was admitted to the intensive care unit, where large amounts of vasopressor drugs and amoxicillin/clavulanate were immediately administered intravenously. A fasciotomy was performed 6 hours later. Coagulation disorders and acute renal

failure developed the next day. Mechanical ventilation and hemodialysis were started. Blood cultures grew *V. vulnificus*. The patient's condition continued to deteriorate and a left limb amputation was performed. She died 3 days after admission.

## Case 2

In October 1999 a 47 year old cirrhotic woman presented to our hospital with a swollen and painful left hand, fever and chills. Approximately 24 hours earlier, while handling a *Tilapia* fish she sustained a spine-fin percutaneous puncture. On presentation, the patient was conscious with a temperature of 38.5°C, pulse 120 beats per minute and blood pressure 120/80 mmHg. There was marked erythema and profound edema of the left hand, particularly of fingers I and II. Laboratory tests were remarkable for a white blood cell count of 3,500/ml, platelet count 30,000/ml, serum pH 7.10 and INR 2.7. The patient was admitted to the intensive care unit and amoxicillin/clavulanate was given intravenously. A few hours later the systolic blood pressure dropped to 80 mmHg. A Swan-Ganz catheter was inserted and large amounts of intravenous fluids and vasopressor drugs were administered. Mechanical ventilation was also started. Blood cultures grew *V. vulnificus*. The patient's condition continued to deteriorate. The whole left upper limb became markedly swollen, but ischemic changes were not seen. The patient became anuric and continuous veno-venous hemofiltration was initiated as irreversible multiorgan failure developed. The patient died 13 days after admission.

## Comment

The severity of *V. vulnificus* infections depends on both bacterial and host factors [1]. A number of enzymes (hyaluronidase, mucinase, DNAase, lipase, protease) and the presence of a capsule appear to be associated with invasive forms of the disease. In addition, *V. vulnificus* is sensitive to the degree of iron bound by transferrin in a given host because it uses transferrin-bound iron for growth. Patients with conditions associated with elevated bound iron saturation or elevated ferritin levels are at increased risk for invasive disease. A Florida study [3] showed that persons with liver disease were 80 times more likely to develop *V. vulnificus* infections. The risk of primary septicemia appears to be particularly important in patients with cirrhosis [4]. In Israel the vast majority of cases occurs from June to November [2] when water temperature and salinity increase. The clinical course of *V. vulnificus* bloodstream infection may have a fulminant clinical course with death occurring within hours [1]. Wound infections caused by *V. vulnificus* range from mild to rapidly progressive cellulitis, with necrosis that mimics gas gangrene. Bacteremia, which has been reported in 35% of the cases, is associated with a mortality of 25%, a rate significantly lower than that reported for primary bacteremia [1]. Early debridement and appropriate antibiotic therapy may reduce the morbidity and mortality associated with infections due to this organism. Although controlled studies have never been performed, a combination of doxycillin and ceftazidime may be indicated in severe infections [5].

Because of the severity of these infections, it is important for clinicians to recognize *V. vulnificus* wounds or bloodstream infections in persons with exposure to the *Tilapia* fish, particularly those with a history of chronic liver disease. Preventive measures should focus on the increased risk from handling the fish harvested from fishponds during warm months, as well as on education about host susceptibility factors.

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