

Vibrio vulnificus - Expect the Unexpected

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INTRODUCTION

Vibrio vulnificus belongs to the family of Vibrionaceae mostly found in warm coastal ecosystems where water temperature ranges from 9 to 31 degrees and salinity between 15 and 25 ppt as a part of its natural flora. Most cases of *V. vulnificus* infections are usually found in tropical or subtropical regions. Although infections are rare. *V. vulnificus* is responsible for most deaths caused by vibrios. Due to global warming and rising sea temperatures, there has been an expansion of the geographical area impacted by the organism and thus the incidence of infection has risen worldwide posing a major threat to public health. Recent studies have identified the organism in previously unaffected regions suggesting that there may be further increase in infections. Another factor contributing to the infection as a major public health concern is that known shellfish control measures fail to prevent or eliminate *V. vulnificus* from shellfish. The bacterium can cause severe gastroenteritis from consumption of raw seafood well as wound infections and necrotizing fasciitis with mortality rates for sepsis and wound infections at 50% and 17% respectively.¹ Once *Vibrio vulnificus* associated case is suspected appropriate antibiotics treatment and surgical intervention must be performed immediately. Though rare, new emerging cases has set an alarm in the medical field and re-emphasizes on the need for active lookout for this bacterium among cases of septicaemia and necrotising fasciitis.

PRESENTATION OF CASE

Herein we present a case of a 60-year-old male patient with no known comorbidities who works as chef in a local toddy shop in Thrissur who presented in our hospital with history of blister like lesions associated with erythema and tenderness over medial aspect of right elbow since 1 day. No history of trauma or insect bite. Patient recalls history of consumption of oysters harvested from local backwaters 1 week back. Over time he had multiple episodes of non-bilious, non-blood stained vomiting and 2-3 episodes of loose stools followed by giddiness and patient was received in the EMD. On examination patient had altered sensorium, blood pressure - 55/33 mmHg and pulse rate- 79 bpm.

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On local examination the patient had a vesicular lesion on the medial aspect of right upper arm with surrounding bluish discoloration, associated tenderness, with peripheral pulses normally felt. Initial blood investigations showed elevated total count (26350) predominantly neutrophilia, prolonged PT (15.60 sec) and deranged RFT (urea – 46 mg/dL, Creatinine - 2.3 mg/dL) and LFT (SGOT – 52 u/l, SGPT – 57 u/l, ALP =77 U/L, Bilirubin total-1.6 mg/dL, bilirubin direct - 0.10 mg/dL). Arterial blood gas reports suggestive of metabolic acidosis with respiratory alkalosis. Blood investigations on subsequent days showed elevation in blood urea and serum creatinine levels up to 181 mg/dL and 2.2 mg/dL respectively on day 4 of hospitalisation.

by daily dressing. Exactly 1 month after admission, skin grafting was done on left leg and right arm. Patient is still on regular follow up and has shown a successful graft uptake. Patient has also been made aware of the cause and safety measures to be taken to avoid further attack as his occupation is a major risk factor for the infection.

CLINICAL DIAGNOSIS

Primary septicemia with necrotising fasciitis in the right upper arm and both lower limbs.

DIFFERENTIAL DIAGNOSIS

- Anaphylactic shock
- Acute kidney injury
- Leptospirosis
- Diabetic ulcers

PATHOLOGICAL DISCUSSION

Vibrio vulnificus, a gram-negative halophilic bacterium commonly found in warm coastal waters. *V. vulnificus* causes three distinct syndromes of which the deadliest one is primary septicemia which is caused by consumption of contaminated raw seafood with case fatality rates of more than 50% and possibility of death within 72 hours of onset of symptoms.² It contributes to wound infections acquired when an open wound is exposed to contaminated sea water or it can also result in infections limited to the gastrointestinal tract.³ Risk factors include advanced age (>60 yrs), male gender, chronic liver disease immunodeficiency and hematological disorders. Consumption of alcohol even as little as 30 ml/day significantly increases the risk of contracting the infection. Risk increases in patients with End stage renal disease, gastrointestinal disorders (surgery, achlorhydria), patients receiving parenteral Iron therapy and diabetes.^{4,5}

The organism has the ability to evade destruction in highly acidic environment such as stomach by enzyme mediated neutralization. It can penetrate the intestinal wall and enter into blood stream. Complement activation and opsonization followed by phagocytosis of the bacterium is associated with release of cytokines and recruiting of additional leucocytes which results in systemic inflammatory response syndrome which is often seen with *V. vulnificus* associated disease. Elevated iron levels (parenteral iron therapy, hematological disease) is a risk factor since iron is believed to facilitate the infection by enhancing the growth of the organism. Studies reveal the presence of toxins and hemolysin which contributes to the cytotoxic effects of the organism by excessive production of reactive oxygen species in the host body leading to necrotic cell death resulting in the cutaneous lesions



Figure 1. Initial Presentation of the Patient in EMD



Figure 2. Stage of Necrotising Fasciitis After Wound Debridement



Figure 3. One Month After Skin Grafting was Done

Patient also developed similar lesions in both legs and was taken up for wound debridement and escharectomy. Intraoperatively the underlying tissue was found to be vascular with no pus discharge. Tissue biopsy culture and sensitivity reported sterile. Culture isolate from blood identified the organism to be *Vibrio vulnificus* by VITEK MS system. Patient was treated with IV cefoperazone, ampicillin, and doxycycline along with multiple wound debridement. Blood urea and creatinine levels dropped from the 8th day of hospitalisation. Features of sepsis resolved, and patient's general condition improved. Patient was given vacuum dressing. Ulcer showed signs of healing and care was given

associated with the infection. Lipopolysaccharides holds responsible for endotoxic shock like picture associated with the infection causing a drastic fall in the mean arterial pressure severe sepsis has been described as the most common presentation.¹ Symptoms occur within 7 days which may be delayed up to 14 days after ingestion of raw or undercooked seafood mostly shell fish.⁶ The condition typically presents as a sudden onset of fever followed by bullous like cutaneous lesions mostly in the lower limbs along with gastrointestinal complaints such as nausea, vomiting and diarrhea. Cutaneous lesions may progress to form necrotizing fasciitis or necrotizing vasculitis.^{7,8} Septic shock (systolic blood pressure <90) and altered mental status has also been reported in many cases.

Therapeutic approach towards *Vibrio vulnificus* associated disease can be seen in 2 aspects medical and surgical management both of which are equally important. Preferred combination of antimicrobial therapy against primary sepsis is with ceftazidime 2 g IV 8th hr + doxycycline 100 mg IV/PO every 12th hr.^{1,2} Surgical intervention is a must for patients with severe tissue infection since antimicrobial therapy alone cannot achieve the therapeutic levels at the site due to thrombosis of the blood vessels supplying the affected area. Wound debridement is necessary to remove necrotic tissue and reduce the bacterial burden in the site.^{3,7} Hyperbaric oxygen therapy is also considered as an adjunctive therapy. Prevention of the infection holds a superior role in handling the spread of infection among the public. Public should be well aware of the mode of spread of the infection and the

Various preventive that should be adopted. Preventive measures against infection include wearing protective clothing while handling raw shellfish and avoid exposure of open wounds to sea or brackish water. Chefs and food handler's even household cooks should be educated on proper and safe cooking of shellfishes like oysters. Proper preparation of oysters require cooking the shellfish in boiling water or steam until the shells open spontaneously followed by further cooking for 5 minutes and proper straining of the water *V. vulnificus* .¹ being the causative agent of a potentially fatal infection has now become a great health care burden and also a potential threat to previously unaffected countries due to the rapid spread in the geographical distribution associated with global warming. The varying resistance profiles of the organism is

also a significant healthcare concern.⁹ Thus it is important to gain more thorough understanding about the pathophysiology and antibiotic resistance profile which is key for drawing appropriate clinical and therapeutic guidelines.

FINAL DIAGNOSIS

Primary septicemia with necrotising fasciitis in right upper arm and both lower limbs caused by *Vibrio vulnificus*.

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