



RESEARCH ARTICLE

SEVERE WOUND INFECTION DUE TO *VIBRIO FLUVIALIS* IN PATIENT WITH  
*HEMOPHILIA B*: AN EMERGING HUMAN PATHOGEN

\*Dr. Kirti Nirmal, Dr. Vikas Manchanda and Dr. C.P. Baveja

Department of Microbiology, Maulana Azad Medical College and LNJP Hospital,  
Bahadur Sha Zaffar Marg, New Delhi -110002, India

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ABSTRACT

*Vibrio fluvialis* is a pathogen commonly found in coastal environs. Considering recent increase in numbers of diarrheal outbreaks and sporadic extra-intestinal cases, *V. fluvialis* has been considered as an emerging pathogen. Human infections caused by *V. fluvialis* are rarely reported. The most common clinical presentation of *V. fluvialis* infection is acute gastroenteritis with diarrhea. Reported extra-intestinal infections caused by *V. fluvialis* have included wound infection, bacteremia, septicemia, peritonitis, hemorrhagic cellulitis and cerebritis.

Key words:

*Vibrio fluvialis*, Hemophilia B,  
wound infection.

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INTRODUCTION

*Vibrio* species are free-living bacteria that are commonly found in aquatic environments. A small subset of these species can cause disease in humans, including gastroenteritis, wound infections, and septicemia in susceptible hosts (Furniss et al., 1977). Five species can produce wound infections: *Vibrio parahaemolyticus*, *Vibrio vulnificus*, *Vibrio alginolyticus*, non-O:1 *Vibrio cholerae*, and *Vibrio damsela* (Morris, 2003). *V. fluvialis* is a halophilic bacterial pathogen and primarily causes excessive watery diarrhea. *Vibrio fluvialis* is one of the emerging food borne pathogens all over the world (Furniss et al., 1977; Morris, 2003). The distribution of virulence factors and molecular epidemiological features of this pathogen remain mostly unknown (Morris, 2003). *V. fluvialis* is one of halophilic vibrio is distinct from non-cholera vibrios and have been recognized increasing as potentially pathogenic bacteria in extra-intestinal infections (Chakraborty et al., 2007). It is Gram-negative bacterium, which has a curved cell morphology and polar flagella for motility.<sup>4</sup> The important biochemical features of this organism include conversion of nitrate to nitrite, do not cleave L-lysine or ornithine, activate arginine dihydrolase, produce indole but not acetoin, ferment sucrose, D-mannitol, L-arabinose, maltose, trehalose, D-galactose, and

D-galacturonate (Chakraborty et al., 2007; Farmer et al., 2003). Most of the vibrios, including *V. fluvialis* occur widely in the aquatic milieu, mostly in these as, estuaries and brackish waters (Ina et al., 2003). It rarely causes human infection. Acute gastroenteritis with diarrhea is the most common clinical presentation of *V. fluvialis* infection, and accounted for 10% of *Vibrio* spp. gastroenteritis cases in a survey in the United States (Altekruse et al., 2000). *V. fluvialis* is an important cause of cholera-like bloody diarrhea and causes wound infection with primary septicemia in immunocompromised individuals from developed to underdeveloped countries, especially in regions with poor sanitation (Morris, 2003). Additionally, *V. fluvialis* has been reported to cause extra-enteric infections, such as necrotizing fasciitis and bacteremia, which were associated with minor trauma and exposure to fish, raw oysters, shellfish, crabs and seawater (Tsai et al., 2004). Here, we report the case of hemophilia young male patients with lower leg distal tibia bone fracture with ankle dislocation wound infection by *V. fluvialis* in road traffic accident.

CASE REPORT

A 24-year-old young male had admitted to orthopedic casualty with the acute history of fallen from bike at around morning hours near Agra Uttar Pradesh highway. He had shifted to male orthopedic ward for further evaluation and management. Patient came with the complaint of pain and swelling of right leg and bleeding from right leg were also present. (Fig.1) There

\*Corresponding author: Dr. Kirti Nirmal,

Department of Microbiology, Maulana Azad Medical College and LNJP Hospital, Bahadur Sha Zaffar Marg, New Delhi -110002, India.

was history of loss of consciousness for 1 -2 minutes present at the time of accident. There were no history of ENT bleed, vomiting, seizure and injury to any other body parts. Patient has known case of Hemophilia B since childhood. He used to receive factor IX at occasionally at the time of severely bleeding from any body parts. The man denied any history of consumption of raw oysters or other uncooked seafood and participating in water activities such as boating, swimming, fishing or any exposure to marine environment, but mentioned that 6 days previously he had waded in brackish water after being attacked by fire ants. There was no significant past history of any chronic illness, hospitalization and alcohol consumption. No relevant family history was present. On admission, patient was conscious, responding well on commands, his body temperature was 37°C, pulse rate 126/min, respiratory rate 20/min,  $SP_{O_2}$  99 % and blood pressure 128/68 mm Hg.

The patient was lethargic but cooperative. Neither pale conjunctiva nor icteric sclera was observed. Physical examination at the time of admission revealed right leg swelling, tenderness and crepitus as well as deformity at distal end were present. Distal pulse was palpable. Laboratory investigations yielded the following values at day one: Hemoglobin 9.6 mg/dl, hematocrit, 25%; WBC, 7800 cells/mL, differential leucocytes count (87% neutrophils, 7% lymphocytes, and 6% monocytes); platelet count, 1.80 lakh platelets/mL, serum glucose, 106 mg/dL, blood urea 24  $\mu$ g/dl serum creatinine, 0.6 mg/dL, alanine aminotransferase, 36U/L (reference, 0–36U/L), prothrombin time, 12.2 sec (international normalized ratio, 1.7), partial thromboplastin time, 37 sec (normal control, 28.4 s), Na/K + electrolytes 140/4.0 mmol/L, liver enzymes like SGOT/ SGPT 34/42mg/dl, serum protein 6.4 mg/dl, serum Alkaline phosphates 54 mg/dl, serum albumin 3.6 mg/dl, Tridot were negative. After all investigation patient had surgical procedure as external fixator with wound debridement under general anesthesia. At the time of procedure clinician had send wound aspirate sample in microbiological department for culture and sensitivity before starting antibiotics. Patient had also received 6 vials (3000 U) of factor IX for hemophilia B at time of surgical procedure. Every alternate day at the time of dressing sample was received in microbiological laboratory for repeat isolation as culture and sensitivity. Patient Stool sample were negative for *vibrio fluvialis*.

### Microbiological procedure

The purulent exudates collected from the lesion was directly plated on blood agar and Mac-Conkey agar (Fig . 3) as well as made direct smear for gram stain, plates were incubated at 37 °C for 18h. On gram stain occasionally gram negative bacilli along with field full of pus cell in oil immersion field. The isolate, presumably identified as *Vibrio fluvialis* by using Vitek2 compact system, BioMerieux according to the standard procedures: it was oxidase positive, esculine negative and string test positive. It grew on thiosulfate-citrate-bile salts sucrose agar (TCBS, Oxoid) with yellow colonies due to the sucrose fermentation. (Fig. 2) The isolate was susceptible to 10 mg and 150 mg disks of the O/ 129 compound (2, 4-diamino-6, 7 diisopropylperidine phosphate). It also grew in 6.5 % NaCl and was L-lysine Möller (1 % NaCl) and L-ornithine decarboxylase negative and arginine dihydrolase positive. No other bacterial pathogens were isolated.

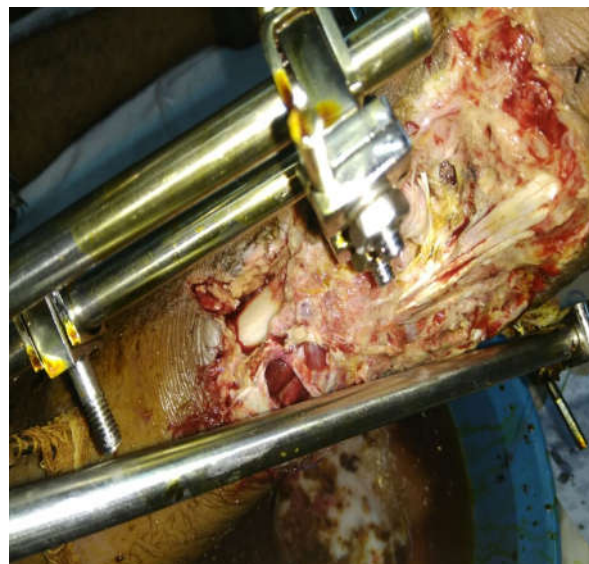


Fig. 1. Figure showing fracture at Right distal end of tibia

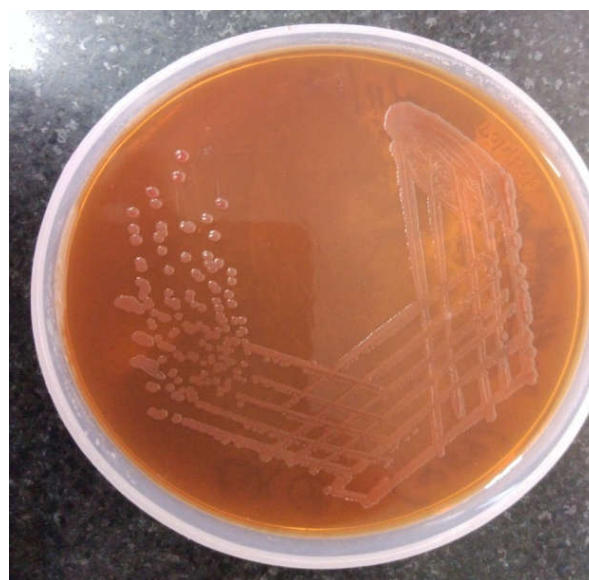


Fig. 2. Figure showing Lactose Non-Fermenter colonies on Mac Conkey agar

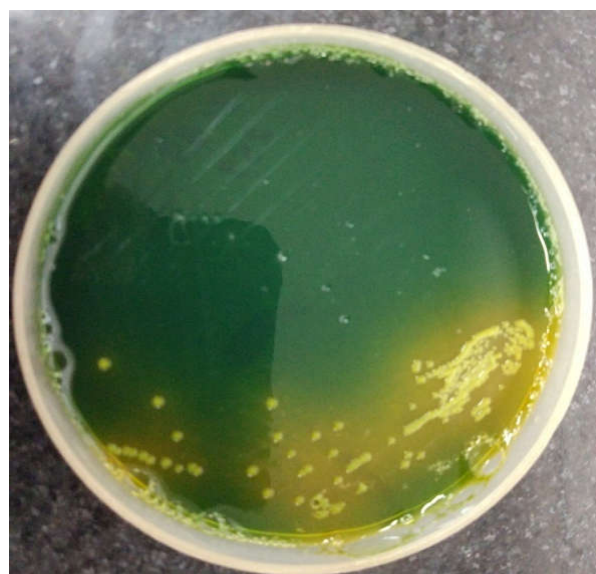


Fig. 3. Figure showing Yellow colonies on Thio-sulfate citrate bile salt sucrose agar (TCBS)

The antimicrobial susceptibility test, performed with the Vitek 2 compact AST card showed that the strain was susceptible to tetracycline (MIC  $\geq$  4), Imipenem (MIC  $\geq$  16), amikacin (MIC 4), gentamicin (MIC  $\leq$  1), ciprofloxacin (MIC  $\leq$  0.25), tigecycline ( $\leq$  0.5) and trimethoprim-sulfamethoxazole (MIC  $\leq$  20). The isolates were resistance to ampicillin (MIC  $\geq$  32), amoxicillin-clavulnic acid (MIC  $\geq$  32), Piperacillin-tazobactem (MIC  $\geq$  128), cefuroxime (MIC  $\geq$  64), cefepime (MIC  $\geq$  64), meropenem (MIC  $\geq$  16) and colistin (MIC  $\geq$  16). So finally this patient had received injection monocef 1gm I/M once a day, injection amikacin 500 mg I/M Bd, Inj Metrogyl I/V TDS, inj trenexa 1 gm TDS and factor IX (6 vials/day x 2 weeks) for hemophilia. *Vibrio fluvialis* in repeated samples was also isolated. Stool sample was no growth for carrier. Patient had been shifted to burn and plastic surgery department for further management.

## DISCUSSION

There are few reports about identification of *V. fluvialis* from wound infections that took place in recreational areas. Several subsets of the *Vibrio* spp., including *V. cholerae*, *V. parahaemolyticus*, and *V. vulnificus*, are known to cause human infection such as septicemia and wound infection, especially in patients with hepatic diseases, diabetes mellitus, adrenal insufficiency, or an immunocompromised status (Klontz *et al.*, 1994). Here we presented a case of wound infection in road traffic accident right leg fracture with ankle dislocation in hemophilic patient caused by *Vibrio fluvialis* microorganism. We suspected that ingestion of seafood or exposure to seawater may have been the source of infection in this case: *Vibrio* spp. are often found in freshwater and seawater and have been found in raw seafood (Farmer *et al.*, 2003). The patient enjoyed eating seafood and mainly bought her fresh seafood from the local supermarket. Our patient denied ever going into the sea or other direct exposure to estuarine water or seawater. In the wound infection (cellulitis) that is caused by direct inoculation of bacteria into the skin or exposure of a wound to contaminated water (Huang and Hsu, 2005).

The bacterium (and its associated toxins) rapidly cause local tissue necrosis associated with hemorrhagic bulla and erosions (Farmer *et al.*, 2003; Huang and Hsu, 2005) Cellulitis may occur when an abrade area of skin is inoculated through bathing in marine waters where *V. fluvialis* thrives, or through exposure to liquid from harvested raw seafood (Morris and Black, 1985) To our knowledge, this is the first described case of hemophilia infection caused by *V. fluvialis*.

It occurred in a patient who had right leg fracture followed by wound infection. There have been many reports of human infection caused by *Vibrio* spp., especially in association with gastroenteritis and diarrheal illnesses (Lee *et al.*, 1981). An increase in the emergence of multi-antibiotics resistant bacteria in recent years is worrisome and the presence of antibiotics resistance genes on bacterial plasmids has further helped in the transmission and spread of drug resistance among pathogenic bacteria (Zulkifli *et al.*, 2009). Antimicrobial resistance has become a major medical and public health problem as it has direct link with disease management (Ramamurthy *et al.*, 2008). The limitation of present study was not able to locate the patient for further follow up and permanent management.

## Conclusion

We report a case of wound infection in hemophilic patient caused by *V. fluvialis* in an immunocompetent patient; the clinical outcome was favorable after administration of an appropriate antibiotic and surgical management. *V. fluvialis* is rarely implicated as causative agents of primary septicemia. However, exposure to seawater or ingestion of raw seafood is an important risk factor in acquiring these infections. As observed in our patient, concomitant bacteremia by *Vibrio* species has not been previously described.

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