

CLINICAL VIGNETTE

An Unusual Case of Cellulitis

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Case

A 37-year-old male with no significant past medical history presented to the emergency department with left ankle cellulitis. Two days prior to admission, he was surfing at Santa Monica beach when he fell off his surfboard, scraping his left ankle against a rock. His surfboard hit his right eyebrow causing a minor superficial laceration. He went to urgent care the day of the injury and his right eyebrow was cleansed and dermabond was applied to the wound. One day later, he returned to urgent care for left ankle redness, pain and swelling. On exam, there was a pinpoint wound, with a small amount of purulent fluid expressed, surrounded by a 4-centimeter patch of erythema. The purulent fluid was for Gram stain and culture and he was started on doxycycline 100 mg twice daily. One day later, the urgent care doctor called the patient advising him to go to the emergency department as the culture was growing Gram-negative rods.

On arrival to the emergency department, his vital signs were temperature 36.8 C, heart rate 70, blood pressure 123/76, respiratory rate 18 and 99% O₂ saturation on room air. Physical exam was notable for erythema and edema of the left ankle that extended up to the left shin with no purulent discharge. The remainder of the physical exam was within normal limits. His laboratory data showed a white blood cell count of 7.37, hemoglobin of 14.5, and platelets of 130. Basic metabolic panel and liver enzymes were within normal limits. He was admitted for left lower extremity cellulitis and was started on ceftriaxone and continued on doxycycline. Blood cultures were negative. Left ankle X-ray revealed a radiopaque foreign body near the lateral malleolus. Podiatry was consulted and extracted the foreign body, which was a 0.5 cm seashell. Ultimately, his left ankle wound culture revealed *Vibrio alginolyticus* and *Photobacterium damsela* (both sensitive to doxycycline). He was discharged with a 10-day course of doxycycline and made a full recovery.

Discussion

Skin and soft tissue infections associated with saltwater exposure should prompt the practitioner to consider alternative infectious organisms that are unique to water. In serious or life-threatening infections, antimicrobials should be selected that empirically treat virulent organisms found in water. There are many bacterial pathogens encountered in seawater including but not limited to *Escherichia coli*, *Salmonella* spp., *Proteus* spp., *Pseudomonas aeruginosa*, *Aeromonas hydrophila* and

Streptococcus aureus.¹ However, *Vibrio* spp. are the causative pathogens for the majority of diseases associated with ingestion of contaminated seafood or exposure to seawater.

There are over 100 *Vibrio* species, which are free living Gram-negative, rod shaped bacteria that live in estuarine or marine environments.² In particular, *Vibrio alginolyticus* is the most common cause of *Vibrio* associated wound infections in humans in the United States and is almost always associated with exposure to seawater.³ The incidence of vibriosis outbreaks has been increasing in developed countries, possibly in part due to higher ocean temperatures that favor the spread of non-cholera *Vibrio* species.¹ *Vibrio* wound infections typically occur from a pre-existing wound with subsequent saltwater exposure or from wounds associated with participating in marine activities.⁴ Most infections with *V. alginolyticus* are mild, and do not require antibiotics in an immunocompetent host. In this particular case the patient was immunocompetent and it was likely the presence of the foreign body that delayed resolution of his cellulitis. *V. alginolyticus* is typically susceptible to doxycycline, fluoroquinolones, and azithromycin.

Of the *Vibrio* species, *V. cholerae*, *V. vulnificus*, and *V. parahaemolyticus* are more virulent and can cause serious, rapidly progressive infections in humans. *V. cholerae* causes acute secretory diarrhea, and in rare cases can cause wound infections typically from the *V. cholerae* non-O1 serogroups.⁵ *V. vulnificus* and *V. parahaemolyticus* infections are caused by ingestion of contaminated seafood or exposure of open wounds to sea water. *V. vulnificus* and *V. parahaemolyticus* manifest as skin and soft tissue infections, gastroenteritis, and primary or secondary septicemia. Rapid diagnosis of *V. vulnificus* infections is essential as treatment delays greater than 72 hours after the onset of symptoms can raise the fatality rate to 100%.¹ As a result, *V. vulnificus* is responsible for greater than 95% of seafood related deaths in the United States.¹ Patients with cirrhosis, diabetes, and chronic kidney disease are more predisposed to *V. vulnificus* and *V. parahaemolyticus*.⁶ Cultures can be useful in diagnosis as *Vibrio* spp. are typically easy to culture, though this should not delay empiric treatment.¹ According to the Centers for Disease Control and Prevention, recommended treatment of *V. vulnificus* includes doxycycline and a third generation cephalosporin for a 7 to 14 day course.⁷

Photobacterium damsela, the second bacteria that grew on culture in our case, is a Gram-negative rod that causes primarily wound infections in humans. Most of these infections originate

from wounds exposed to salt water or handling of infected fish or tools.⁸ The severity of infections from *P. damsela* can range from cellulitis to life-threatening necrotizing fasciitis and multiorgan failure.⁸ Cases of necrotizing fasciitis from *P. damsela* have a higher mortality rate than those caused by *V. vulnificus*. As discussed previously mentioned, *V. vulnificus* usually affects patients with underlying comorbidities such as end stage liver disease while *P. damsela* can occur in healthy hosts.⁸

In summary, patients presenting with skin and soft tissue infections after salt water exposure, have a broader differential of infectious organisms with particular attention to the *Vibrio* species. Obtaining a thorough history allows for rapid diagnosis and treatment of these infections. If there is a puncture wound, then imaging is indicated to rule out foreign body as this could delay wound healing and resolution of the infection. Antibiotics should be tailored to treat not only common bacterial pathogens that cause cellulitis, but also common organisms found in seawater. Rapid treatment, appropriate antimicrobial selection, and in some cases wound debridement are key, particularly for the more virulent *Vibrio* species such as *V. vulnificus*.

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