Shewanella algae Infection in United States Naval Special Warfare Trainees

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Background

- *Shewanella algae* is a motile Gram-negative bacillus
- *S. algae* is a ubiquitous marine microorganism that is an uncommon cause of human disease.
- Naval Special Warfare (NSW) trainees undergo unique physiologic stresses that include prolonged immersion in marine water, most notably during a continuous five-day operational exercise on land and sea with minimal sleep, arduous conditions including poor sanitation and hygiene ("Hell Week").
- NSW trainees may be uniquely vulnerable to disease from this pathogen.
- We describe the clinical syndromes and outcomes of *Shewanella* infection in NSW trainees.

Methods

- We retrospectively reviewed all cases of *Shewanella* spp. infections at Naval Medical Center San Diego between 2012-2015.

Results

- Five patients were identified with clinical cultures demonstrating *Shewanella algae* consisting of one positive blood culture and five unique wound cultures.
- All isolates were sensitive to ceftriaxone, levofloxacin, piperacillin/tazobactam, trimethoprim-sulfamethoxazole and meropenem.
- The patients were all male between the ages of 21 to 26. (Table 1)
- All of the patients had no prior comorbidities and were otherwise healthy prior to starting NSW training.
- Four of the five patients had recently completed Hell Week, and all four presented with skin and soft tissue infections (SSTI). (Table 1)
- Two of the four patients with SSTI had concomitant bacteremia: one patient with cellulitis and *Shewanella* bacteremia, and another patient with a polymicrobial lower extremity necrotizing fasciitis and septic shock, with *Shewanella* and *Vibrio harveyi* in the wound and *V. harveyi* bacteremia. The fifth patient presented after a ruptured tympanic membrane following an eighteen-foot dive and subsequently developed otitis media. (Table 1)
- All patients responded to debridement, if appropriate, and systemic antimicrobial therapy. (Table 1)

Case	Gender /Age	Clinical Presentation	Treatment
1	26/M	• Polymicrobial, including *S. algae,* bilateral lower extremity SSTI and acute focal bacterial nephritis • *S. algae* bacteremia	• Completed 14 days initially with piperacillin/tazobactam and finished with levofloxacin
2	26/M	• Left lower extremity *Vibrio harveyi* and *S. algae* necrotizing faciitis • *Vibrio harveyi* bacteremia	• Wide excisional debridement with split thickness skin graft left lower extremities • Completed three weeks of ceftazidime
3	22/M	• Multiple right pre-tibia *S. aureus* and *S. algae* abscesses	• Incision and drainage with wound vac • Completed 14 days initially with cefazolin plus and then finished with clindamycin
4	21/M	• Polymicrobial, including *S. algae,* bilateral lower extremity SSTI	• Local wound care • Completed 10 days parental and then finished with oral dicloxacillin
5	21/M	• *S. algae* and *P. aeruginosa* otitis media following a ruptured right tympanic membrane	• Completed 14 days of oral ciprofloxacin

Table 1. Case characteristics

Discussion

- *Shewanella algae* may cause invasive and potentially life-threatening infection in immunocompetent hosts
- Such invasive infections occur in otherwise-healthy NSW trainees in the setting of prolonged physiologic stress.
- Active surveillance is ongoing to monitor for *Shewanella* spp. infections in this population.
- Mitigation strategies are needed to minimize the risk of disease from rare pathogens in demanding military environments.

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