

# CASE STUDY

## The case of the critically ill fisherman

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Commercial fishermen are considered to have one of the most dangerous professions in the world, with an estimated mortality rate of up to 45.8 in 100,000 fishermen in Atlantic Canada per year.<sup>1</sup> In addition to working in extreme weather conditions, experiencing physical discomfort, psychological stress and physical injury, exposure to infectious pathogens can also occur. This case describes the clinical course of a young, immunocompetent, fisherman with refractory sepsis and multiple organ failure caused by *Erysipelothrix rhusiopathiae*, a rare but well-described occupational pathogen associated with farming and fisheries. Erysipelothrix infection usually causes cutaneous lesions or, more rarely, bacteremia with endocarditis in immunocompromised individuals. This case illustrates the importance of a detailed history in the diagnosis and management of patients with atypical presentations.

### Case Summary

A 27-year-old, previously healthy man, presented to his local emergency department with a 24-hour history of nausea, vomiting, and worsening respiratory distress. His only relevant history was consumption of 2-4 alcoholic drinks per day. On admission, he was afebrile, but hypotensive (systolic blood pressure 90-100 mmHg), tachycardic (120 bpm), and required 100% FiO<sub>2</sub> to maintain an SpO<sub>2</sub> greater than 90%. His bloodwork indicated severe sepsis with fulminant liver and renal failure, including a lactate of 27.3 mmol/L, INR 5.6, glucose 1.4 mmol/L, total bilirubin 140.9 µmol/L, AST 28,014 U/L, ALT 11,497 U/L, creatinine 426 µmol/L, white blood cell count 13.2 x 10<sup>9</sup>/L, and platelets 23 x 10<sup>9</sup>/L.

The patient was intubated and transferred to a tertiary care center Intensive Care Unit. He required aggressive fluid resuscitation and inotropic support for refractory hypotension. He was treated empirically with a broad-spectrum antibiotic (piperacillin/tazobactam 2.25g IV every 6 hours) for septic shock of unknown etiology. Aerobic and anaerobic blood cultures drawn on day one of his hospitalization grew Gram-positive rods, later identified as *Erysipelothrix rhusiopathiae* (susceptible to penicillins, cephalosporins,

quinolones, clindamycin, and erythromycin, but resistant to vancomycin) and Methicillin Sensitive *Staphylococcus aureus* (MSSA). Repeat blood cultures on day 4 continued to grow only *E. rhusiopathiae*. A transthoracic echocardiogram was done with high quality images that showed normal valves with no evidence of endocarditis. Subsequent blood cultures, taken on day 8 and 9, were sterile. Viral serology was negative, including hepatitis B, hepatitis C, and HIV.

A detailed history with collateral revealed that the patient had been self-medicating for musculoskeletal pain with extra-strength acetaminophen and ibuprofen. His liver failure was attributed to a combination of acetaminophen overdose and hypoperfusion in the context of septic shock. Further inquiry elicited that he was a fisherman by trade and had a work-related injury (fish bite) on his left hand while working two weeks prior. Examination of his left hand showed a cutaneous lesion that appeared consistent with an erysipeloid infection.

Unfortunately, despite appropriate therapy, the patient died on day 14 of his hospitalization from multiple organ system failure secondary to refractory septic shock.

### Discussion

*Erysipelothrix rhusiopathiae* is a Gram-positive, non-acid-fast, non-spore forming, facultatively anaerobic, rod-shaped bacterium. It is known to be highly susceptible to penicillins, cephalosporins and clindamycin, but is one of few Gram-positive organisms resistant to vancomycin.<sup>2</sup>

*E. rhusiopathiae* is a widespread organism in nature and is a pathogen or a commensal in many wild and domestic mammals, birds, crustaceans, and fish.<sup>2,3</sup> The organism was first identified by Robert Koch in 1878 and later established as a human pathogen by Friedrich Rosenbach in 1909.<sup>3</sup> Swine erysipelas due to *E. rhusiopathiae* is one of the most well-known and documented disease presentations in animals, as outbreaks can have devastating consequences to herd health and farming productivity.<sup>4</sup> *E. rhusiopathiae* has been identified as a cause of superficial and invasive

soft tissue infection in humans following marine injuries and exposures, and outbreaks of erysipeloid have been associated with occupational exposure to fish and crustaceans.<sup>3,5,6</sup> This organism survives and grows on the exterior mucoid slime of fish and other marine creatures without causing disease in the animals themselves.<sup>2</sup>

Three main forms of human *E. rhusiopathiae* infection have been described. The most common is erysipeloid, a localized cellulitis usually found on the fingers or hands of a patient due to contact with infected animals or their products. This is usually unaccompanied by fever or systemic symptoms. There is also a more generalized cutaneous form with systemic features including fever and arthralgias, in the setting of negative blood cultures.<sup>3</sup> Finally, *E. rhusiopathiae* infection can present as bacteremia, commonly associated with native valve endocarditis.<sup>7</sup> In 49 reported cases of *E. rhusiopathiae* bacteremia over 15 years, the incidence of endocarditis was 90%, with 60% being on previously normal heart valves.<sup>3</sup> These rates are much higher than many other organisms typically associated with endocarditis.<sup>3</sup>

There are an increasing number of reports of patients with *E. rhusiopathiae* bacteremia with no evidence of endocarditis, although this is usually in immunocompromised hosts.<sup>8</sup> In patients who do present with *E. rhusiopathiae* bacteremia, septic shock is an extremely rare occurrence.<sup>9,10</sup> Sinclair *et al.* describe a rapidly progressive sepsis secondary to *E. rhusiopathiae* bacteremia in an immunocompromised patient, that may have been acquired from a fishing wire injury.<sup>6</sup> Another case report by Surrin *et al.* reported a diabetic patient without endocarditis with *E. rhusiopathiae* bacteremia that initially presented with septic shock. Her initial insult appeared to be a localized cellulitis on her foot from injury while wearing slippers at a fish market.<sup>10</sup>

Interestingly, infection with *E. rhusiopathiae* in immunocompetent patients has been associated with alcohol abuse.<sup>11,12</sup> A study by Reboli & Farrar showed that among 49 bacteremic patients, 33% with endocarditis also reported alcohol abuse.<sup>3</sup> It was also the only identifiable risk factor in an *E. rhusiopathiae* infection in an immunocompetent patient without endocarditis described by Fakoya *et al.*<sup>12</sup> Our patient was previously very healthy aside from moderate to severe alcohol intake. As such, his history of alcohol use may have made him more vulnerable to *E.*

*rhusiopathiae* infection than the general population with similar occupational exposures. The physiologic stress of his multifactorial liver injury may have then resulted in a relative immunocompromised state, enabling a subclinical infection to progress to sepsis.

## Conclusion

*E. rhusiopathiae* infection associated with rapidly progressive sepsis and septic shock in a previously immunocompetent patient without endocarditis is a rare clinical event. This case emphasizes the importance of a thorough occupational and social history in patients with sepsis of unknown etiology to demonstrate risk factors for unusual pathogens. A high index of suspicion should be raised in patients with known occupational exposures and with Gram-positive rods in blood cultures failing to respond to vancomycin.<sup>2,11</sup> Moreover, since most human *E. rhusiopathiae* infections result from occupational exposures, it is important to emphasize awareness and safe work practices in vulnerable populations.

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