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CASE STUDY

Catch of a lifetime – *Erysipelothrix rhusiopathiae* bacteraemia, septicaemia, endocarditis and osteomyelitis in a Newfoundland crab fisherman and butcher

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CASE PRESENTATION

Initial presentation

A 71-year-old Caucasian male from rural Newfoundland presented to the Emergency Department (ED) complaining of reduced energy with fainting, shivering and chills during the prior 2 days. The patient's medical history included coronary artery disease, where 11 years prior he had five coronary artery bypass grafts placed. He also had a percutaneous drug-eluting stent and is currently being followed for severe mitral regurgitation. In addition to his cardiac history, he also has hypertension and dyslipidaemia. His surgical history includes a cholecystectomy 3 years ago following admission for obstructive jaundice. He consumes alcohol very rarely and gave up smoking 16 years ago after a 30 pack-a-year smoking history. He lives with his wife in their own home in rural Newfoundland. He is an active commercial crab fisherman and also involved in secondary processing of crab at a local fish plant.

Physical examination was normal, and preliminary investigations revealed normal complete blood count, electrolytes and renal function. Blood and urine cultures were also performed. The patient was prescribed trimethoprim-sulfamethoxazole and was asked to follow-up in a family practice clinic.

On return to the clinic, two days post-treatment, the patient reported improved symptoms. Urine cultures were negative for bacterial growth, but blood cultures were positive for the growth of Gram-negative bacilli; however, the specific species was not identified. The patient reported an allergy to penicillin and was discontinued on trimethoprim-sulfamethoxazole, provided 500 mg of oral azithromycin and continued on 250 mg of oral azithromycin for the next 4 days. Two days later, his blood culture was specifically reported as *Erysipelothrix rhusiopathiae*.

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2–3 weeks after initial presentation

During the following month, the patient presented twice to the ED. Contrasting from his initial presentation, he complained of right-sided pleuritic abdominal pain. He was without fever or other signs or symptoms of infection. The patient was treated with topical antibiotics, an antinausea medication, and was told to use a heating pad on his spine. He was informed that his pain was possibly due to a musculoskeletal cause. He did not find any relief with prescribed treatment regiments.

4 weeks after the initial presentation

The patient returned to the ED with a fever of 38.6 (measured with a home monitor), weakness and continued right-sided pleuritic abdominal pain. He appeared generally unwell and had reduced energy and appetite. Specifically, he stated that he was too tired to cut firewood, and his family agreed this was entirely abnormal for him. He reported no weight loss or changes in voiding. Laboratory investigations reported that BUN was elevated at 9.7 mmol/L, lactate was elevated at 2.2 mmol/L and D-dimer was significantly elevated at 927 ng/m. The patient had a subsequent computed tomography scan of his chest and abdomen, but no abnormalities were detected. The patient also had blood and urine cultures taken. The patient was diagnosed empirically with sepsis and instructed to return to the ED every 24 h to receive 2 g of intravenous ceftriaxone for 1 week.

On return to the ED 4 days later for his antibiotic infusion, the urine cultures were negative; however, the blood cultures were again positive for *E. rhusiopathiae*. The patient reported feeling better after taking the ceftriaxone, so he was instructed to continue with the current medication for the remaining 3 days and scheduled for an urgent echocardiogram to assess his cardiac function and rule out endocarditis.

Repeat blood cultures were all negative for bacterial growth. The follow-up echocardiogram showed no obvious vegetation or thrombus, normal size and systolic function and a mitral valve leaflet prolapse with moderate mitral valve insufficiency that has been stable since 2016.

6–10 weeks after initial presentation

During the next 5 weeks, the patient presented once each week to either the ED or his family doctor with non-specific musculoskeletal pain in his neck and back. He was treated with steroids, diazepam and morphine during his visits but without any lasting relief. During these visits, he did not have any fever, weakness or other signs of infection.

11–13 weeks after initial presentation

Six weeks after the patient's treatment for sepsis, he returned to the ED with continuing back pain and a fever of 38.0°C. The patient reported pain on movement and was now using a walker to aid in his mobility. At rest, he was pain-free. He was subsequently admitted to hospital with a repeat blood culture, and a computed tomography scan of his lumbar spine was performed. The patient's blood cultures were again reported positive for *E. rhusiopathiae*. The patient's computed tomography scan showed degenerative changes and a 'moth-eaten' appearance at L5, indicating possible diskitis or osteomyelitis at this level. The patient also had a new loud diastolic murmur heard at the left sternal border.

As an inpatient, he was treated with 2 g of intravenous ceftriaxone every 24 h, along with several other medications including a beta-blocker and an antiplatelet medication given the patient's high risk of cardiac complications. The patient was treated for 12 days, during which time repeat blood cultures confirmed sterilisation of the patient's blood. The patient was discharged with a peripherally inserted central catheter line and was continued on 2 g of intravenous ceftriaxone every 24 h for the next 6 weeks.

24 weeks after initial presentation

Upon a follow-up bone scan, whole body gallium scan and echocardiogram after completion of an antibiotic regimen, the patient showed no signs of osteomyelitis or other degenerative changes at any level, no vegetation or thrombus on the cardiac valves, normal cardiac size and normal systolic function.

DISCUSSION

E. rhusiopathiae is a 'facultative, non-spore-forming, non-acid-fast, small, Gram-positive bacteria'.[1] The organism has been reported as infecting humans and other animals since the late 19th century[2] but has been relatively rare with fewer than 200 cases of *E. rhusiopathiae* infection reported in the literature as of July 2018 and only 51 of those cases involving septicaemia. *E. rhusiopathiae* can be distinguished from other Gram-positive rods through a variety of tests. The organisms it is most often mistaken for include *Listeria*, *Brochothrix*, *Corynebacterium* and *Kurthia*. *E. rhusiopathiae* can be distinguished from *Listeria, Brochothrix* and *Corynebacterium* by the inclusion of lysine and glycine in its cell wall as opposed to mesodiaminopimelic acid. It can also be distinguished from *Kurthia* using a catalase test.[1]

The organism can be found in many locations, including both terrestrial and marine environments. *E. rhusiopathiae* is able to survive for extended periods of time in its environment and has been known to infect a variety of animals including swine, turkeys, chickens, ducks, emus, sheep, lambs, fish and shellfish. *E. rhusiopathiae* infections have most often been reported due to occupational exposure, such as by butchers, farmers and fish and seafood handlers.

Three forms of *E. rhusiopathiae* infection are recognised in humans today: a localised cutaneous lesion form i.e., erysipeloid, a generalised cutaneous form and a septicaemic form often associated with endocarditis.[1] Erysipeloid is the most common form of infection in humans, with the septicaemic form being the rarest. The septicaemic form *E. rhusiopathiae* is usually subacute in nature but can cause severe valvular disease. *E. rhusiopathiae* endocarditis is a particularly virulent infection as even with appropriate treatment and management the mortality rate is 40%, much higher than the endocarditis caused by other organisms.[3]

In this particular case, the patient was frequently in contact with snow crab (*Chionoecetes opilio*), which are a known carrier of *E. rhusiopathiae*. He worked both as a commercial fisherman and a seasonal employee at a processing plant, where he specifically was involved in a technique referred to as crab butchering. Crab butchering involves separating the legs, body and claws of cooked crab and then shelling each piece to remove the meat inside. This is a labour-intensive, highly-skilled process,[4] during which workers continually handle sharp, broken crab shells, leading to a high risk of puncture and exposure to pathogens, with the patient self-reporting frequent skin punctures while handling crab in both avenues of employment. As such, crab butchers are likely at an increased risk of work-related *E. rhusiopathiae* exposure. While *E. rhusiopathiae* is a rare pathogen, physicians should have a higher index of suspicion for this disease in populations with increased environmental exposure to the bacteria, such as crab butchers and other similar professionals.

While this case does highlight a rare and interesting infection, it also offers several developments in the presentation and management of *E. rhusiopathiae* sepsis for physicians treating the disease.

First, this case is one of very few to show a progression of *E. rhusiopathiae* sepsis to osteomyelitis and degenerative disc changes, highlighting some of the rarer and more deadly complications of this infection. This case, along with the few cases seen previously in the literature with this complication,[5] helps characterise the presentation of osteomyelitis secondary to *E. rhusiopathiae* sepsis. This allows physicians to identify these issues early and determine which patients are at risk for developing these serious complications.

In addition, our patient is one of the only reported cases to show recurrence of *E. rhusiopathiae* infection after treatment as well as showing an extended length of infection compared to most reported cases of *E. rhusiopathiae* sepsis. The mean duration of symptoms in one case series was found to be 6.6 weeks,[3] whereas our patient had symptoms lasting over 12 weeks. While the cause of this recurrence and extended infection time is difficult to determine, this case demonstrates to physicians that these extended courses are possible so that they may be aware of them in their patients.

Although no cause of this extended course has been identified, one factor may have been the reduced length of initial treatment the patient received. Our patient received 1 week of antibiotic treatment, while most others gave 6–8 weeks of treatment initially.[5] Given that our patient did have recurrence of his disease, this provides evidence for physicians to use a prolonged course of antibiotics when treating *E. rhusiopathiae* sepsis, even on the first presentation.

Finally, this case confirms that while penicillin has been identified as the first-line treatment

for *E. rhusiopathiae* sepsis,[6] third-generation cephalosporins can be used to effectively treat this condition in patients who are unable to take penicillin.[7]

CONCLUSION

This case report depicts a case of septicaemic *E. rhusiopathiae* potentially after occupational exposure to snow crab (*C. opilio*). The patient showed a progressive infection, commencing as bacteraemia progressing to a septicaemic blood infection with likely endocarditis and finally developed into an osteomyelitis in the lumbar spine. While initial treatments of 1 week of intravenous ceftriaxone were unsuccessful, in the long term, a 10-week course of ceftriaxone proved effective, and the patient experienced a full recovery within 3 months of discharge from hospital. This case identified several important teaching points for healthcare providers to ensure effective prevention and management of this rare yet virulent pathogen.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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