



## Case study

# First reported case of vertebral osteomyelitis due to *Erysipelothrix rhusiopathiae*

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## ABSTRACT

We describe a case of acute vertebral osteomyelitis with associated prevertebral abscess due to *Erysipelothrix rhusiopathiae* in an immunocompetent adult with recent known traumatic inoculation from the barb of a fish.

## Case report

A 48-year-old man presented to the emergency department with back pain and chills. He had a history of asthma, spinal stenosis, and multiple traumatic injuries to his extremities requiring orthopedic hardware placement in his right shoulder, left hip, and right knee; he also endorsed a previous anaphylactic reaction to penicillin. Two weeks prior to presentation he sustained a puncture injury to his left index finger from the barb of a sea robin (*Prionotus carolinus*), a fish with fan-like fins containing stiff rays commonly found in shallow waters of the western Atlantic Ocean, that he caught while fishing recreationally. Within four days he developed an elevated painful lesion at the puncture site that his primary care doctor diagnosed as an abscess, which was incised and drained; the patient then completed a 10-day course of trimethoprim-sulfamethoxazole. Six days prior to presentation he sustained a minor mechanical fall onto his buttocks that resulted in lower back pain and right-sided sciatica. His lower back pain became severe over the following days with the addition of chills and night sweats.

In the emergency room, his temperature was 37.8 °C and other vital signs were unremarkable. His exam revealed a healing 5-mm circular lesion on his left index finger, paraspinal lumbar tenderness that was more pronounced on the right, and decreased sensation to light touch in the distal right lower extremity. CBC revealed a WBC count of  $11.0 \times 10^9/L$  (neutrophils, 69.9%; lymphocytes, 19.9%; monocytes, 9.3%; eosinophils, 0.6%), hemoglobin of 12.4 g/dL, and platelets of  $280 \times 10^9/L$ ; BMP revealed sodium of 134 mEq/L, potassium of 3.3 mEq/L, and chloride of 95 mEq/L, but was otherwise unremarkable; CRP was 147.3 mg/L and ESR was  $> 130$  mm/h. MRI of the spine

revealed disc protrusion at L5-S1 with right S1 nerve impingement, L5-S1 osteomyelitis with surrounding phlegmon extending into the prevertebral and epidural space, and a  $9 \times 2$  mm abscess within the prevertebral space (Fig. 1).

Neurosurgery performed a right L5-S1 microdiscectomy and drainage of the adjacent purulent fluid. Microdiscectomy wound cultures grew *Erysipelothrix rhusiopathiae* (2 of 2 specimens) and coagulase-negative *Staphylococcus* species (1 of 2 specimens). Blood cultures remained negative. Transthoracic echocardiography, which was performed in light of the high incidence of endocarditis in patients with invasive *E. rhusiopathiae* infections, was unremarkable and showed no evidence of endocarditis. Susceptibility testing was not performed. The patient was treated with an 8-week course of ceftriaxone, which he tolerated well despite his reported penicillin allergy, and had gradual resolution of his back pain.

## Discussion

*E. rhusiopathiae* is a facultative anaerobic gram-positive rod that is a rare cause of human disease, occurring primarily as an occupationally-acquired zoonosis in individuals with exposure to contaminated animal and fish products. There are three well-defined manifestations in humans: a localized cellulitic form known as erysipeloid, a diffuse cutaneous form, and a septicemic form that is associated with endocarditis [1]. Rare manifestations include abscess formation, septic arthritis, and osteomyelitis [2–7].

Apart from the present case, there are only two previous confirmed reports of *E. rhusiopathiae* osteomyelitis in the literature (Table 1): left

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Fig. 1. MRI spine with contrast demonstrates L5-S1 osteomyelitis with surrounding phlegmon extending into the prevertebral and epidural space, and a 9 × 2 mm abscess within the prevertebral space.

hip osteomyelitis in a child without known exposures or previous injury [3] and pubic osteomyelitis in an adult who was thought to have suffered traumatic inoculation of the bacterium approximately 19 years earlier [4]. Two additional cases in which imaging suggested osteomyelitis but tissue cultures were negative occurred in adults with likely but unspecified occupational exposure [5,6].

Our case appears to be unique in light of the acute onset of vertebral osteomyelitis following distant traumatic skin inoculation, in this case a finger puncture wound from a fish barb, consistent with hematogenous seeding. The acute formation of abscesses and osteomyelitis in this case is particularly interesting as *E. rhusiopathiae* is known to be a minimally-aggressive slow-growing organism [1,8]. Furthermore, our patient had no predisposing factor for systemic disease, including no evidence of alcohol or drug dependence, immunosuppression, chronic liver disease, or diabetes mellitus [2]; however, as spinal trauma is a known risk factor for vertebral infections, our patient's acutely herniated intervertebral disc may have contributed to the adjacent development of his abscess and osteomyelitis.

*E. rhusiopathiae* can be isolated on standard culture media, including blood agar plates. Growth is slow, often taking two days. There are two distinct colony types: smooth colonies, which appear as Gram-positive rods or coccobacilli, and rough colonies, which are larger and appear as long filaments. Gram stain is not distinctive as it may feature either colony morphology; rough colonies can decolorize and appear Gram negative. *E. rhusiopathiae* is catalase negative, non-motile, and distinctively produces hydrogen sulfide on triple sugar iron agar [9]. Isolates may be misinterpreted as *Lactobacillus* spp. or *Enterococcus* spp. due to similarities in their colony morphology [10]. Accurate and rapid identification is possible through molecular identification as well as mass spectrometry [2,11].

Clinical & Laboratory Standards Institute (CLSI) interpretive criteria exist for susceptibility testing of *E. rhusiopathiae* and isolates are generally susceptible to penicillin, cephalosporins, fluoroquinolones, and

Table 1  
Characteristics of *E. rhusiopathiae* osteomyelitis as described by published case reports.

Case report authors	Patient age (years), sex	Notable past medical history	Type of infection	Timing of inoculation	Contact with animals	Diagnosis of osteomyelitis	Treatment
This report	48, M	Spinal stenosis, orthopedic injuries	Digital skin abscess, prevertebral abscess, lumbar osteomyelitis	14 days prior (digital trauma from fish barb)	Recreational fishing	Tissue isolate	Surgery, ceftriaxone
Mukhopadhyay et al. [3]	5, M	None	Hip osteomyelitis	Unknown	Unknown	Tissue isolate	Surgery, amoxicillin-clavulanic acid
Denes et al. [4]	57, M	None	Pubic osteomyelitis	19 years prior (pelvic trauma from cow horn)	Farming	Tissue isolate	Rifampicin, levofloxacin
Upapan and Chayakulkeeree [5]	62, M	Diabetes mellitus, cirrhosis	Psoas abscess, paravertebral abscess, bacteremia	Unknown	Farming	Suspected on imaging, but tissue isolate negative	Surgery, levofloxacin
Romney et al. [6]	67, F	Diabetes mellitus	Lumbar spondylitis, bacteremia	Unknown	Raw fish preparation	Suspected on imaging, but tissue isolate negative	Penicillin-G

carbapenems. It is intrinsically resistant to vancomycin, aminoglycosides, and sulfonamides, and resistance to clindamycin and erythromycin can also occur [9]. Resistance to sulfonamides is notable as trimethoprim-sulfamethoxazole is a common choice for empirical treatment of abscesses, which our patient initially received following incision and drainage of a presumed abscess on his index finger. Similarly, the intrinsic resistance of *E. rhusiopathiae* to vancomycin should be taken into consideration when patients receive empiric treatment for osteomyelitis, particularly in patients with recent traumatic exposure to animal or fish products.

### Conclusion

*E. rhusiopathiae* is a rare cause of invasive infections in humans. It may be under-diagnosed in light of its slow growth and potentially misdiagnosed due to the similarities in its colony morphology to more common laboratory isolates. Nevertheless recent exposures can lead to invasive infections even in patients without identifiable risk factors, as demonstrated in this case. Thus a high index of suspicion for *E. rhusiopathiae* infection is necessary when patients present with characteristic exposure histories regardless of timeline.

### Disclosure statement

The authors declare that they have no competing interests.

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### Consent

Written informed consent was obtained from the patient for publication of this case report. A copy of the written consent is available for

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