Erysipelothrix rhusiopathiae-induced endocarditis: a case report

Ayman El Idrissi[1]*, Petri Kox-van Gastel[1*]

European Journal of Medical Case Reports
Volume 5(11):319–324
https://doi.org/10.24911/ejmcr/173-1619539379

ABSTRACT

Background: *Erysipelothrix rhusiopathiae* is a rare zoonosis. We present a case of *E. rhusiopathiae* bacteremia of unknown origin complicated by endocarditis of the aortic and mitral valves.

Case Presentation: A 39-year-old man presented with fatigue, diaphoresis, fevers, and substantial weight loss. Upon physical examination, a gallop rhythm of the heart was heard. Blood cultures eventually revealed an *E. rhusiopathiae* infection. Vegetation on the non-coronary cusp of the aortic valve and the mitral valve were seen on echocardiography. The patient was treated with intravenous penicillin for 6 weeks. Following the treatment, the non-coronary cusp was found to be prolapsed and perforated. Aortic valve regurgitation had also led to dilatation and hypertrophy of the left ventricle.

Conclusion: *Erysipelothrix rhusiopathiae* is a rare cause of infective endocarditis. As untreated *E. rhusiopathiae* can cause irreversible damage to the heart valves and death, prompt consideration of this infection is warranted in any patient at an increased risk.

Keywords: *Erysipelothrix rhusiopathiae*, erysipeloid, infective endocarditis, aortic valve, mitral valve, case report.

Received: 27 April 2021 **Accepted:** 22 October 2021 **Type of Article:** CASE REPORT **Specialty:** Infectious Diseases

Correspondence to: Ayman El Idrissi
*Department of Internal Medicine, Elkerliek Hospital, Helmond, The Netherlands.
Email: ayman.elidrissi@gmail.com
Full list of author information is available at the end of the article.

Background

Erysipelothrix rhusiopathiae is a bacillus that is carried by different animals [1]. It can cause disease in both animals and humans. In rare cases, *E. rhusiopathiae* infection can result in bacteremia with the potential to induce endocarditis [2]. Prompt treatment with antibiotics is essential to prevent permanent damage to the heart valves and death. Penicillin is considered the preferred drug in a dose of 12 to 20 million international units per day for the duration of 4 to 6 weeks [2].

In this paper, we present a case of *E. rhusiopathiae* bacteremia of unknown origin complicated by endocarditis of the aortic and mitral valves. To the authors' knowledge, this case study is the first in the literature pertaining to *E. rhusiopathiae*-induced endocarditis in The Netherlands.

Timeline

Week 0	First symptoms develop, including fatigue, fever and loss of appetite.
Week 5	First presentation at outpatient clinic.
Week 6	Symptoms persist. Hospitalization for further analysis.
Week 6 + 2 days	Blood cultures positive for Gram-positive bacteria. Patient started on intravenous amoxicillin 6 g daily.
Week 6 + 3 days	*Erysipelothrix rhusiopathiae* isolated from blood culture. Intravenous amoxicillin dose increased to 12 g daily.
Week 6 + 6 days	Echocardiography shows endocarditis of aortic valve and suspected endocarditis of mitral valve. Switch to intravenous penicillin 2 million international units 6 times daily.
Week 13	Antibiotic treatment completed. Patient discharged from hospital.

Case Presentation

A 39-year-old man presented at the internal medicine outpatient clinic due to fatigue, diaphoresis and fevers. His past medical history included an appendectomy, congenital heart murmur and alcohol abuse. The symptoms developed roughly 5 weeks before the clinic visit. The patient initially experienced recurring fevers of up to 39°C during the evenings. Subsequently, he developed loose stools and noticed a loss of appetite with an inability to eat solid foods, particularly meat. His weight decreased by 12 kg. Physical examination was unremarkable with the exception of a gallop rhythm of the heart. Laboratory tests showed elevated liver enzymes and inflammatory parameters (Table 1). Serological markers for Epstein-Barr virus, cytomegalovirus, hepatitis A, hepatitis B, hepatitis C, and hepatitis E were negative. Abdominal ultrasound revealed

Table 1. *Laboratory test results at presentation.*

BLOOD TEST	VALUE	REFERENCE RANGE
Sodium (mmol/l)	134	135-145
Potassium (mmol/l)	4.1	3.5-4.8
Creatinine (µmol/l)	75	55-107
Bilirubin (µmol/l)	12	3-17
Alkaline phosphatase (U/l)	197	40-115
Gamma-glutamyltransferase (U/l)	144	0-55
Aspartate transaminase (U/l)	103	0-35
Alanine transaminase (U/l)	181	0-45
C-reactive protein (mg/l)	93	0-10
Ferritin (µg/l)	837	20-250
Erythrocyte sedimentation rate (mm/hour).	89	0-15
Hemoglobin (mmol/l)	7.8	8.5-11.0
White blood cell count ($\times 10^9$/l)	7.0	4.0-10.0

an aspect of the liver congruent with hepatic steatosis as well as a hepatic lesion. By means of magnetic resonance imaging the hepatic lesion was identified as a hemangioma. The patient also underwent endoscopy. This uncovered gastric hypomotility and an open pyloric aperture.

The patient revisited the clinic 1 week after initial presentation. His symptoms had persisted and his weight had decreased by an additional 5 kg. He was hospitalized for further analysis. During the hospitalization, he repeatedly developed fevers of up to 39.6°C. Measurements of C-reactive protein remained elevated in excess of 90 mg/l. Blood cultures were taken. Within 2 days, the blood cultures showed growth of Gram-positive bacteria. The patient was started on intravenous amoxicillin 6 g daily. *Erysipelothrix rhusiopathiae*, resistant to trimethoprim and vancomycin, was isolated from the blood culture 1 day after initiation of antibiotic treatment. The amoxicillin dose was increased to 12 g daily in order to treat a potential endocarditis adequately. Physical re-examination substantiated the presence of a cardiac murmur. More specifically, a grade two diastolic murmur at the second intercostal space right to the sternum was heard. There were no peripheral stigmata of infective endocarditis. An electrocardiogram showed a sinus rhythm and first-degree atrioventricular block. Transthoracic echocardiography revealed grade two aortic regurgitation with a non-coronary cusp prolapse. The aortic valve was suspected of containing vegetation. Transesophageal echocardiography confirmed the presence of vegetation on the non-coronary cusp measuring 1.1 by 0.8 cm (Figures 1 and 2). The mitral valve was also suspected of containing minor vegetation.

Upon confirmation of the diagnosis endocarditis, the antibiotic treatment with amoxicillin was switched to intravenous penicillin 2 million international units 6 times daily. The patient had received amoxicillin for 4 days in total. The treatment with penicillin was continued for a total antibiotic treatment duration of 6 weeks. After initiation of antibiotic treatment, the patient quickly recuperated. C-reactive protein values normalized within 2 weeks of treatment initiation. Within days the fever dissipated and the fatigue subsided. He recovered his appetite and was again able to eat solid foods. His weight gradually increased by 12 kg over the course of 6 weeks. Along with the weight gain, serum glucose levels also increased. Fasting glucose values were indicative of type two diabetes. The patient was advised to reduce his carbohydrate intake. No medication was started for the diabetes. The patient was discharged from hospital after completing the antibiotic treatment.

Interestingly, electrocardiograms initially exhibited a progressive increase in the PQ interval, i.e. the time between depolarization of the atria and depolarization of the ventricles, during the first week of penicillin treatment. The PQ interval peaked at 370 ms and then decreased to approximately 250 ms. The patient briefly developed a broad complex tachycardia with a possible aberrant conduction 4 weeks after antibiotic treatment initiation. The heart rate ranged between 115 and 130 beats per minute. The patient did not experience any clinical symptoms at the time of the broad complex tachycardia. Subsequent electrocardiograms showed a sinus rhythm with an increased PQ interval and occasional ventricular extra systoles.

After completion of antibiotic treatment, the heart valves were reevaluated by means of transthoracic and transesophageal echocardiography. In addition to being prolapsed, the non-coronary cusp was found to be perforated. Aortic valve regurgitation had also led to dilatation and hypertrophy of the left ventricle. The left ventricular ejection fraction remained good, however, at an estimated 70%. The mitral valve showed no anomalies. There were no clinical signs of cardiac decompensation. Ten months after initial presentation at the outpatient clinic, the patient did not experience any symptoms and he had reassumed his everyday life.

The patient was asked about possible causes of the *E. rhusiopathiae* infection. Extensive anamnesis did not result in the identification of a clear origin. The patient was born and had lived for most of his life in Eastern

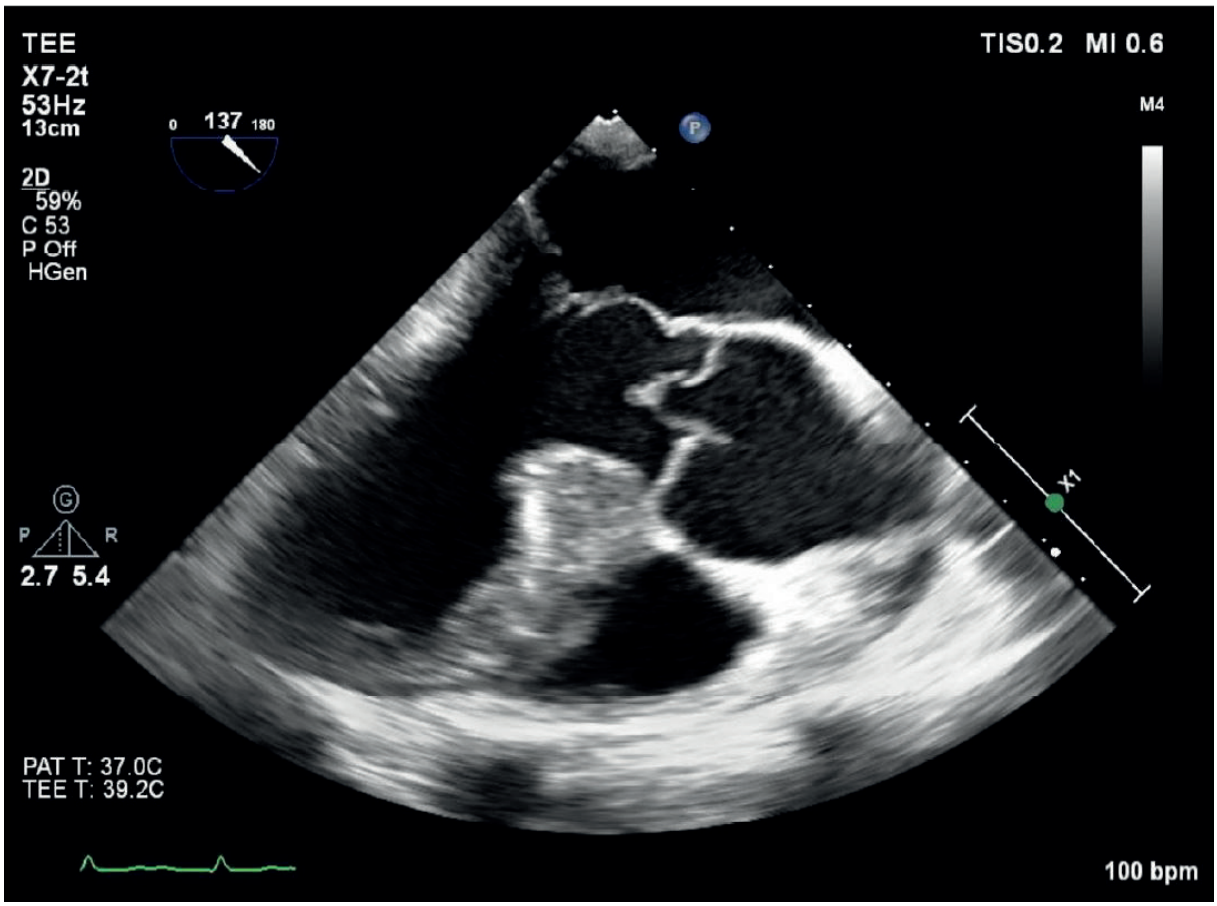

Figure 1. *Transesophageal echocardiography showing vegetation on and a prolaps of the non-coronary cusp.*

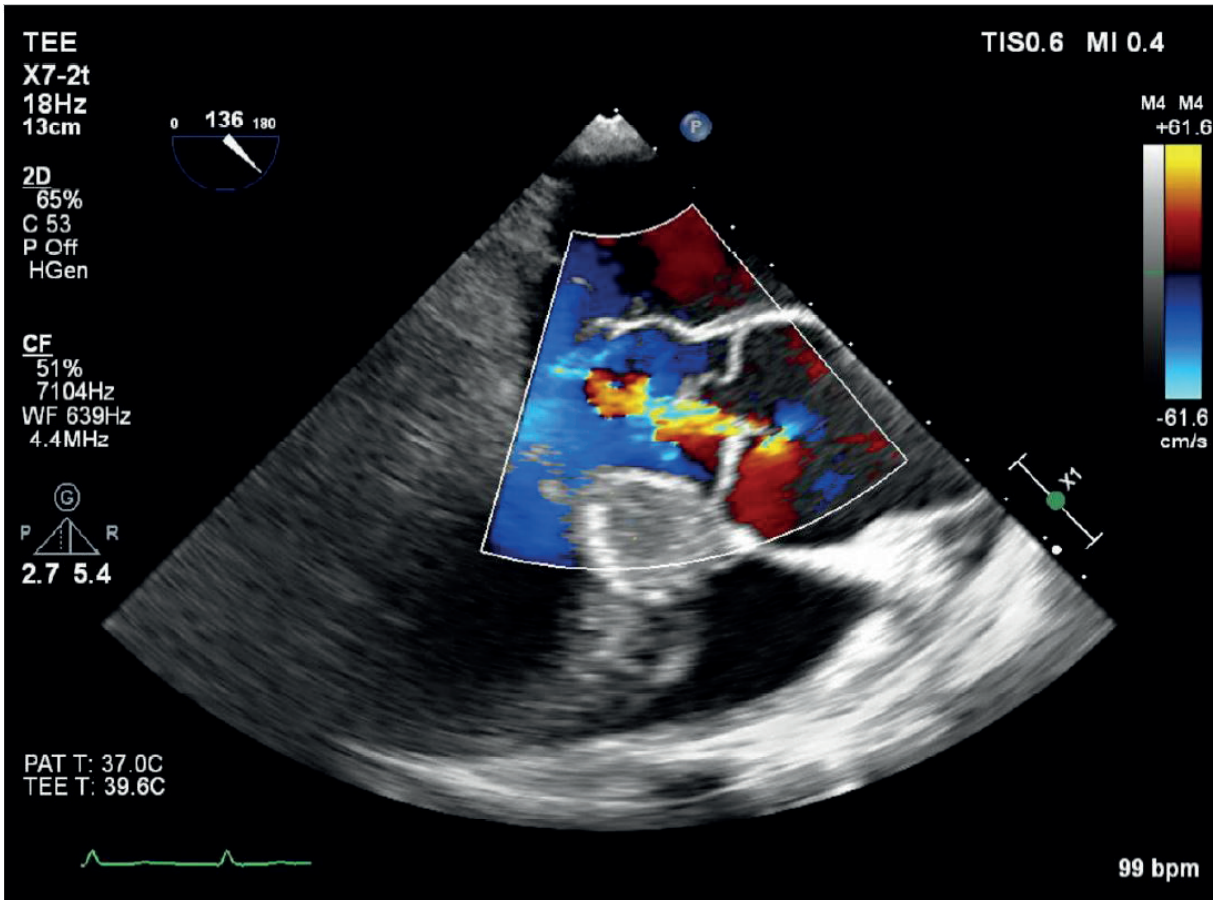

Figure 2. *Transesophageal echocardiography with color Doppler showing grade two aortic regurgitation.*

Europe. He migrated to the Netherlands for work purposes. His work as a forklift truck operator did not involve any contact with animals or animal products. He denied having had any recent wounds or dental procedures. The patient did, however, mention that he considered his living conditions to be unsanitary, as he shares a dwelling with multiple migrant workers.

Discussion

Erysipelothrix rhusiopathiae is a Gram-positive rod-shaped bacillus. It belongs to the *Erysipelothrix* genus, which in addition to *E. rhusiopathiae* consists of seven other species [1]. Robert Koch was the first person to isolate *Erysipelothrix* spp. He extracted the bacillus from mice that had been injected with meat blood in 1876 and originally termed it *Erysipelothrix muriseptica*. In 1882, Friedrich Löffler identified *Erysipelothrix* as the causative agent for swine erysipelas [1,2]. It took another two decades before Friedrich Julius Rosenbach recognized the bacillus as a human pathogen. He isolated *Erysipelothrix* from a patient with cutaneous lesions in 1909. Rosenbach named the cutaneous lesions erysipeloid [2].

Many animals are potential carriers of *E. rhusiopathiae*. The bacillus has been found in cattle, dogs, cats, rodents, poultry, crabs, and fish among others [2]. Swine form the main reservoir. Estimates from the 1990s indicate that 30% to 50% of swine are carriers [3]. The exact infection rate is, however, dependent on vaccination uptake. Vaccination of farm animals against *E. rhusiopathiae* is voluntary in The Netherlands [4]. Infected pigs carry *E. rhusiopathiae* in lymphoid tissues of the digestive tract and discharge it into the environment through their saliva and feces. Other animals and humans can subsequently become infected through the consumption of contaminated victuals or cutaneous wounds [2,3].

Human infection with *E. rhusiopathiae* is primarily associated with occupational exposure. Fishermen, butchers, abattoir workers, and veterinarians are among those who are at an in increased risk of contracting the bacillus. Other risk groups are immunocompromised individuals and people suffering from chronic alcoholism, diabetes mellitus, liver cirrhosis, malnutrition or tuberculosis [5,6]. Infections have also been reported following dog and cat bites [5,7,8]. Human-to-human transmission of *E. rhusiopathiae* has not been reported in the literature [5].

Human infections with *E. rhusiopathiae* can present in three forms. First, the bacillus can cause a localized cutaneous infection known as erysipeloid. An initial red spot develops at the infection site, often on the hands, followed by purple discoloration of the surrounding skin. The lesion typically has an elevated border and may be disproportionately painful. Systemic symptoms, such as fever, are rare in erysipeloid [5,9]. Second, localized erysipeloid can advance to a diffuse cutaneous form if left untreated. The diffuse cutaneous form is characterized by expansion of the primary cutaneous lesion and the development of distant lesions which may be bullous. Individuals often suffer from systemic symptoms, including fever and arthralgia, in case of diffuse cutaneous disease [5,9]. Lastly, *E. rhusiopathiae* can present as a primary bacteremic infection. Patients with this form mainly encounter relapsing systemic symptoms rather than skin manifestations. Bacteremic infection with *E. rhusiopathiae* following consumption of contaminated seafood has been reported in the literature [9].

The present case involves a primary bacteremic infection complicated by endocarditis of the aortic valve and suspected involvement of the mitral valve. Endocarditis is a known complication of *E. rhusiopathiae* bacteremia with a mortality rate of approximately 33% [9]. Relatively few cases of aortic valve endocarditis because of this bacillus have been reported in the literature. In fact, a literature review by Hua et al. [10] identified only ten cases of aortic valve endocarditis published in the period between 1912 and 2014. The review shows that patients, as in our case, generally present with various non-specific symptoms, including fever, fatigue, weight loss and poor appetite. Symptoms such as hepatosplenomegaly, pruritis, lower back pain and abdominal pain have also been reported [10].

Echocardiography does not help to distinguish the causative agent of infective endocarditis, but can be used as a means of assessing valvular damage. Typical echocardiographic findings include thickening or perforation of the heart valve, vegetation on the heart valve or a paravalvular abscess [10]. In the present case, vegetation on and regurgitation of the aortic valve was seen, with the mitral valve also suspected of containing vegetation. Endocarditis involving multiple heart valves is rare. One case report from Spain describes endocarditis of the aortic and mitral valve due to *E. rhusiopathiae*. The patient required both intravenous antibiotic treatment with penicillin and aortic and mitral valve replacement as a result of severe regurgitation of both heart valves [11]. One extremely rare case of *E. rhusiopathiae*-induced endocarditis involving three heart valves has also been reported in the literature [12].

Erysipelothrix rhusiopathiae is inherently resistant to vancomycin. Additionally, resistance to aminoglycosides and sulfonamides is widespread among isolates of this species. The treatment of choice remains ampicillin and penicillin. Alternative treatment in the form of fluoroquinolones and macrolides is possible in patients allergic to penicillin [13,14].

Conclusion

Erysipelothrix rhusiopathiae is a rare cause of infective endocarditis in humans. The case presented above

illustrates that *E. rhusiopathiae*-induced endocarditis is associated with non-specific symptoms that may result in a significant diagnostic delay. The exact cause of the infection in this particular patient is unknown, but his history of alcohol abuse is likely to have contributed to his susceptibility. As untreated *E. rhusiopathiae* can cause irreversible damage to the heart valves and due to its high mortality rate, prompt consideration of this infection is warranted in any patient falling into one of the risk groups.

What is new?

The infection described is a very rare zoonosis. This case report illustrates that one should especially consider this infection in certain risk groups, such as individuals that suffer from alcohol abuse. Moreover, this is the first reported case pertaining to a patient in the Netherlands with *E. rhusiopathiae*-induced endocarditis.

List of Abbreviations

cm	centimeters
E. rhusiopathiae	Erysipelothrix rhusiopathiae
g	gram
kg	kilogram
l	liter
mg	milligram
mm	millimeters
mmol	millimole
ms	milliseconds
U	units
µmol	micromoles

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

Funding

No funding to declare.

Consent for publication

Permission for publication of this case study was given by the patient described in this paper.

Ethical approval

In accordance with Dutch law on medical scientific research involving human subjects (Wet Medisch-Wetenschappelijk Onderzoek met Mensen) and hospital regulations, no approval is required from the local ethics committee for the publication of an individual case report for which the patient has granted consent.

Author details

Ayman El Idrissi[1], Petri Kox-van Gastel[1]

1. Department of Internal Medicine, Elkerliek Hospital, Helmond, The Netherlands

References

1. Opriessnig T, Forde T, Shimoji Y. *Erysipelothrix* spp.: past, present, and future directions in vaccine research. Front Vet Sci. 2020;7:174. https://doi.org/10.3389/fvets.2020.00174
2. Stackebrandt E, Rebolli AC, Farrar WE. The genus *Erysipelothrix*. In: Dworkin M, Falkow S, Rosenberg E, Schleifer KH, Stackebrandt E, editors. The prokaryotes. New York, NY: Springer; 2006. pp 492–510. https://doi.org/10.1007/0-387-30744-3_13
3. Laber KE, Whary MT, Bingel SA, Goodrich JA, Smith AC, Swindle MM. Biology and diseases of swine. Laboratory Animal Medicine. 2002:615–73.
4. National Institute for Public Health and the Environment. Erysipeloid [Internet]. National Institute for Public Health and the Environment [cited 2020 May 18]. Available from https://www.rivm.nl/erysipeloid-vlekziekte
5. Reboli AC, Farrar WE. Chapter 207. *Erysipelothirx rhusiopathiae*. In: Mandell GL, Bennett JE, Dolin R, editors. Principles and practice of infectious diseases. 6th ed. Philadelphia, PA: Elsevier Churchill Livingstone; 2005. pp 2496–8.
6. Nielsen JJ, Blomberg B, Gaïni S, Lundemoen S. Aortic valve endocarditis with *Erysipelothrix rhusiopathiae*: a rare zoonosis. Infect Dis Rep. 2018;10(3):7770. https://doi.org/10.4081/idr.2018.7770
7. Van der Vusse ML, Spijker GT, Degener JE. Hoofdstuk 6. infecties van de huis, fascie en spieren. In: Hoepelman AIM, Kroes ACM, Sauerwein RW, Verburgh HA, editors. Microbiologie en infectieziekten. 3rd ed. Houten, Netherlands: Bohn Stafleu van Loghum; 2011. pp 137–56. https://doi.org/10.1007/978-90-313-7944-6_6
8. Kobayashi K. Kawano T, Mizuno S, Kubo K, Komiya N, Otsu S. *Erysipelothrix rhusiopathiae* bacteremia following a cat bite. IDCases. 2019;18:e00631. https://doi.org/10.1016/j.idcr.2019.e00631
9. Hand WL. Chapter 134. *Erysipelothrix*. In: Schlossberg D, editor. Clinical infectious disease. Cambridge, UK: Cambridge University Press; 2008. pp 961–3. https://doi.org/10.1017/CBO9780511722240.135
10. Hua P, Liu J, Tao J, Liu J, Yang Y, Yang S. *Erysipelothrix rhusiopathiae*-induced aortic valve endocarditis: case report and literature review. Int J Clin Exp Med. 2015;8(1):730–6.
11. Nassar IM, de la Llana R, Garrido P, Martinez-Sanz R. Mitro-aortic infective endocarditis produced by *Erysipelothrix rhusiopathiae*: case report and review of the literature. J Heart Valve Dis. 2005;14(3):320–4.
12. Tomaszuk-Kazberuk A, Kaminska M, Sobkowicz B, Hirnle T, Prokop J, Lewczuk A, et al. Infective endocarditis caused by *Erysipelothrix rhusiopathiae* involving three native valves. Kardiologia Polska. 2011;69(8):827–9.
13. Jean S, Lainhart W, Yarbrough ML. The brief case: *Erysipelothrix* bacteremia and endocarditis in a 59-year-old immunocompromised male on chronic high-dose steroids. J Clin Microbiol. 2019;57(6):e02031–18. https://doi.org/10.1128/JCM.02031-18
14. Romney M, Cheung S, Montessori V. *Erysipelothrix rhusiopathiae* endocarditis and presumed osteomyelitis. Can J Infect Dis. 2001;12(4):254–6. https://doi.org/10.1155/2001/912086

Summary of the case

1	**Patient (gender, age)**	Male, 39 years old
2	**Final diagnosis**	*Erysipelothrix rhusiopathiae*-induced endocarditis of the aortic valve and mitral valve
3	**Symptoms**	Fatigue, diaphoresis, fevers, loose stools, loss of appetite, weight loss
4	**Medications**	Intravenous penicillin 2 million international units 6 times daily
5	**Clinical procedure**	Blood cultures and echocardiography
6	**Specialty**	Internal medicine, infectious diseases