



Case report

Erysipelothrix rhusiopathiae endocarditis diagnosed by broad range 16S rRNA PCR gene sequencing



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ARTICLE INFO

Article history:

Received 16 June 2019

Received in revised form 27 June 2019

Accepted 27 June 2019

Keywords:

Erysipelothrix rhusiopathiae

Infective endocarditis

16S r RNA

Oman

ABSTRACT

Erysipelothrix rhusiopathiae (*E. rhusiopathiae*) is a rare occupational opportunistic Gram-positive bacillus. Infections caused by *E. rhusiopathiae* are principally a sequel of occupational and recreational exposures to infected animals. Infective endocarditis is a classic, albeit it infrequent, manifestation of invasive infection with this bacterium.

We present a case of *E. rhusiopathiae* mitral valve endocarditis in a farmer with psoriasis presented with acute intractable heart failure requiring valve replacement surgery. *E. rhusiopathiae* was identified by 16S rRNA-based gene sequencing from culture-negative, surgically excised mitral valve leaflets.

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Introduction

Erysipelothrix rhusiopathiae (*E. rhusiopathiae*) is infrequent occupational opportunistic zoonotic human pathogen. It is a fastidious non-spore-forming Gram-positive bacillus [1] with a worldwide distribution in a wide variety of wild and domestic animals, birds and fish [2]. Human infections due to *E. rhusiopathiae* are occupationally related and usually seen among farmers, butchers, veterinarians, and abattoir workers and occur as a result of contact with contaminated animals, their products or wastes, or soil [3]. *E. rhusiopathiae* endocarditis is rare [4], often is subacute in nature with predilection for native aortic valve [5], typically causes extensive destruction of heart valves requiring emergency valve replacement [6] and is frequently associated with unacceptably high mortality [7].

Laboratory identification of *E. rhusiopathiae* is challenging. In addition to standard culture, broad range bacterial PCR using 16S rRNA gene sequencing has been utilized to successfully identify *E. rhusiopathiae* from clinical samples [8,9]. This molecular method is especially advantageous in settings where patients were pre-treated with antimicrobials [10,11]. Clinical and Laboratory Standards Institute (CLSI) interpretive criteria exist for susceptibility testing of *E. rhusiopathiae*. Isolates are normally susceptible

to penicillin, cephalosporins, fluoroquinolones, and carbapenems and intrinsically resistant to vancomycin and aminoglycosides, two frequently used empiric antimicrobials for infective endocarditis awaiting cultures [12]. Penicillin, ceftriaxone or imipenem given intravenously for a total duration of four to six weeks are the antimicrobials of choice for treatment of *E. rhusiopathiae* endocarditis [12].

Case presentation

A 51-year-old farmer with psoriasis vulgaris on topical corticosteroid therapy, presented with a three-week history of fever and progressive dyspnea. A week prior to his current illness, he sustained several skin abrasions and a penetrating puncture wound to his left hand for which he was prescribed oral ciprofloxacin.

Physical examination revealed conscious, ill-looking, and anxious patient with marked pallor and signs of respiratory distress. He was febrile (temperature: 38.9°C), tachycardic (pulse rate: 113/min) and tachypneic (respiratory rate: 26/min) with oxygen saturation of 77% (room air). Blood pressure was 130/79 mmHg. Inspection of the skin revealed several well-demarcated, erythematous psoriatic plaques and a small healed puncture wound of the left hand. No peripheral stigmata of infective endocarditis. Cardiac examination showed elevated jugular venous pressure, and a holosystolic grade 3/6 murmur at the apex with radiation to axilla. Tender hepatomegaly and bilateral crackles were demonstrated.

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Investigations showed hemoglobin: 8.9 g/dl, white cell count: 23,800 cells/ μ L, platelet count: 482,000/ μ L. Biochemistry was noteworthy for C-reactive protein of 280 mg/L (normal range: 0–8 mg/L) and for B-type natriuretic peptide of 33,060 pg/mL (normal: 20–120 pg/mL). Electrocardiogram was normal. Chest x-ray showed alveolar edema. A transthoracic echocardiogram was performed (Fig. 1).

A presumptive diagnosis of infective endocarditis of the mitral valve complicated by acute congestive heart failure was made. Positive pressure ventilation, diuresis, and empiric antimicrobials (vancomycin: 15 mg/kg twice daily and ceftriaxone: 2 g once daily) were initiated after the collection of three sets of blood culture from different venipuncture sites. Despite initial improvement with abatement of fever, symptoms of heart failure became progressively intractable over the next two weeks necessitating valve replacement surgery. Blood cultures (total of 6 sets) remained negative two weeks later and serologies for *Brucella* and *Coxiella burnetii* were negative. Intraoperatively, both leaflets of mitral valve were found to be eroded by large vegetations and were surgically excised. Mitral valve was replaced with a 31-mm St. Jude mechanical prosthesis (St. Jude Medical, Inc., St. Paul, MN). The explanted valve tissue was sent for bacterial, mycobacterial and fungal cultures in addition to histopathological examination.

Excised valve tissue was likewise sent to the national reference laboratory for testing for bacterial 16S ribosomal RNA gene using broad range bacterial PCR. Postoperative course was uneventful and antimicrobials (vancomycin, ceftriaxone) were continued.

Histopathological examination showed a fibrinopurulent exudate with bacterial colonies. Culture of excised tissues and vegetation showed no growth. Broad range 16S rRNA PCR gene sequencing on excised leaflets detected *Erysipelothrix rhusiopathiae* confirming the causative pathogen. Consequently, antimicrobial regimen was switched to intravenous ceftriaxone monotherapy at a dose of 2 g once daily and continued for four weeks postoperatively. Patient was discharged on lifelong anticoagulation and remained symptom-free three years later.

Discussion

Infections caused by *E. rhusiopathiae* are almost always occupationally linked and typically follow abrasions or puncture wounds [3]. Our patient is a professional farmer who suffered several occupational injuries prior to his ailment. Interestingly, the patient was also suffering from active severe form of psoriasis which may facilitated inoculation of the bacterium from a contaminated environment even without a demonstrated injury.

Contrary to published literature [5], this patient presented with acute mitral valve endocarditis with severely aggressive course necessitating valve replacement surgery.

Blood cultures and culture of excised valve tissue remain the standard test for microbial diagnosis in infective endocarditis [10]. In settings of blood culture-negative endocarditis, molecular diagnostics like 16S ribosomal RNA gene PCR/sequencing may be useful [10].

This scenario was true for this patient who had negative blood and valve tissue cultures possibly due to pre-culture administration of a quinolone antimicrobial. Broad range 16s rRNA PCR applied to excised valve leaflets/vegetations in our patient confirmed the presence of *E. rhusiopathiae*.

E. rhusiopathiae endocarditis is best treated with either penicillin G or ceftriaxone for 4–6 weeks [12]. This patient was empirically started on ceftriaxone 2 g once daily for three weeks prior to confirming the diagnosis and continued ceftriaxone for four weeks after surgery. He required prosthetic mitral valve replacement for refractory heart failure complicating extensive valve destruction and associated severe mitral regurgitation. This is consistent with earlier literature suggesting over one third of patients with *E. rhusiopathiae* endocarditis required valve replacement⁵.

Patient consent

Patient consent was obtained for publication.

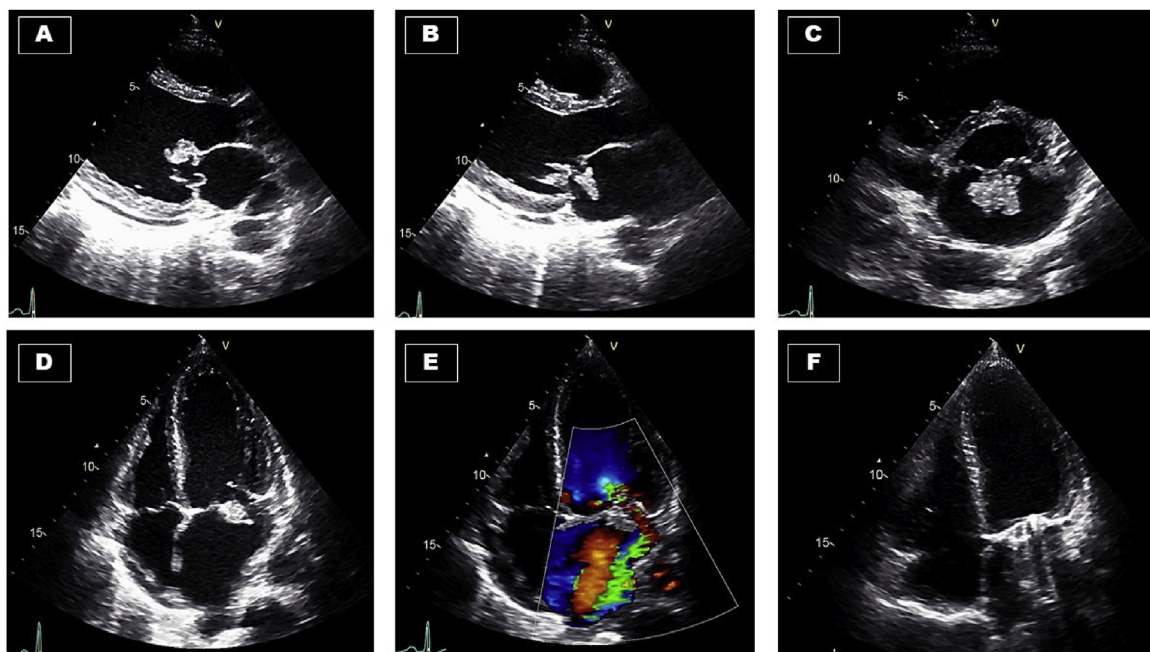


Fig. 1. Transthoracic echocardiographic images: **A:** Parasternal long axis view. There is a large vegetation that measured 10x17 mm attached to the atrial surface of the anterior mitral valve leaflet. **B:** The vegetation and the flail anterior leaflet completely prolapse into the LA. **C:** Off-axis parasternal short axis view showing the large vegetation attached to the tip of the anterior mitral leaflet. In this view, the vegetation measured 19x24 mm. **D:** Apical four chamber view. The vegetation is attached to the tip of the anterior mitral valve leaflet. **E:** Severe mitral regurgitation. **F:** Postoperative apical four chamber view showing a bi-leaflet mechanical prosthesis in the mitral position.

Funding

None.

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