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ID CASE

Prosthetic Valve Endocarditis Caused by *Bartonella henselae*: A Case Report of Molecular Diagnostics Informing Nonsurgical Management

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Identifying the pathogen responsible for culture-negative valve endocarditis often depends on molecular studies performed on surgical specimens. A patient with Ehlers-Danlos syndrome who had an aortic graft, a mechanical aortic valve, and a mitral anulloplasty ring presented with culture-negative prosthetic valve endocarditis and aortic graft infection. Research-based polymerase chain reaction (PCR)/electrospray ionization mass spectrometry on peripheral blood samples identified *Bartonella henselae*. Quantitative PCR targeting the16S-23S ribonucleic acid intergenic region and Western immunoblotting confirmed this result. This, in turn, permitted early initiation of pathogen-directed therapy and subsequent successful medical management of *B henselae* prosthetic valve endocarditis and aortic graft infection.

Keywords. *Bartonella henselae*; culture-negative endocarditis; Ehlers-Danlos syndrome; electrospray ionization mass spectrometry; quantitative PCR.

CASE REPORT

A 58-year-old man with Ehlers-Danlos syndrome, an aortic graft, mechanical aortic valve, and mitral valve annuloplasty ring placed 10 years earlier presented to the hospital with 6 weeks of fever, chills, drenching night sweats, epistaxis, and an unintended weight loss of 16 pounds. He reported taking warfarin and aspirin faithfully. He lived on an organic farm and frequently walked barefoot when ploughing soil. He and his wife had 1 monkey, 2 dogs, and 15 cats, some of which were feral; they previously kept and milked goats.

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Upon his initial presentation, he was febrile (39.5°C), tachycardic (105 beats/minute), and was noted to have mild epistaxis. His physical exam was also significant for temporal wasting, petechial hemorrhages of the conjunctiva and palate, poor dentition, and splenomegaly. Three sets of blood cultures obtained before starting antibiotics were negative for pathogens. Laboratory values included a white blood cell count of $9.7 \times 10^3/\mu L$ with 80% neutrophils, normal creatinine (1.3 mg/dL), low albumin (3.3 g/dL), elevated C-reactive protein ([CRP] 53 mg/L; normal range, 0–9), and an increased internationalized normal ratio of 5.2 (normal range, 0.85–1.15). In addition, he was anemic with a hemoglobin of 10.4 g/dL and thrombocytopenic with platelets of $100 \times 10^3/\mu L$. A transesophageal echocardiogram (TEE) did not reveal any valvular lesions or vegetations. A whole body ^{18}fluorodeoxyglucose-positron emission tomography/computed tomography (^{18}FDG-PET/CT) scan detected abnormal hypermetabolic activity in his graft, extending from the aortic arch into the aortic root/valve prosthesis, as well as his right subclavian artery and spleen (Figure 1). This finding, considered a major criterion for the diagnosis of infective endocarditis, in combination with his persistent fevers and prosthetic valve, both minor criteria, prompted initiation of empiric ceftriaxone and doxycycline for possible infective endocarditis [1]. During his hospital course, the patient developed complications related to anticoagulation and acute kidney injury. Accordingly, we chose to avoid rifampin and gentamicin, until his renal function stabilized.

In order to identify a specific pathogen, we used molecular methods to test deoxyribonucleic acid extracted from whole blood collected in ethylenediaminetetraacetic acid-containing vacutainers (5 mL) and to test antibodies in serum (2 mL) collected on hospital days 2 and 3 [2, 3]. Research-based polymerase chain reaction (PCR)/electrospray ionization mass spectrometry (ESI-MS) detected *Bartonella henselae*, which was confirmed using quantitative PCR targeting the 16S-23S ribonucleic acid intergenic region [2, 3]. In addition, Western immunoblots yielded a reactivity pattern consistent with *B henselae* infection (Figure 2) [4]. Based on these results, the patient's antibiotics were tailored to ceftriaxone and gentamicin [5]. He responded well to this regimen, with resolution of his fever and chills 4 days later. He completed a total of 4 weeks of gentamicin and 8 weeks of ceftriaxone [6]. By 6 weeks posthospitalization, his CRP decreased to 0.5 mg/dL, and his appetite improved such that he returned to his baseline weight. He remains clinically well on twice-daily oral doxycycline, on which he is expected to remain for life-long suppressive therapy.

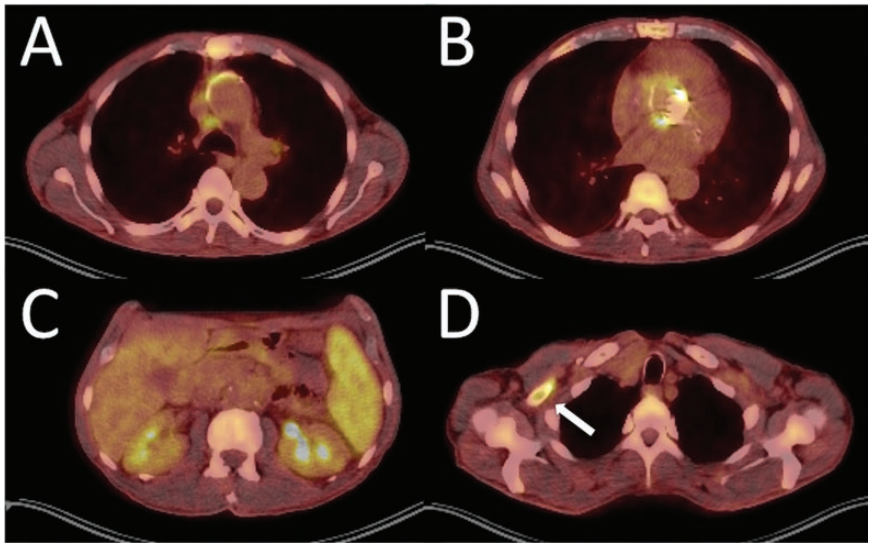

Figure 1. Images obtained using a ^{18}fluorodeoxyglucose-positron emission tomography/computed tomography scan showing abnormal hypermetabolic activity in the aortic arch (A), aortic root/valve prosthesis (B), spleen (C), and axillary region of the right subclavian artery (D).

DISCUSSION

In this patient with an aortic graft infection and prosthetic valve endocarditis, molecular diagnostic tests on peripheral blood permitted rapid and noninvasive identification of *B henselae,* prompt initiation of an appropriate antibiotic regimen, and avoidance of surgery. To our knowledge, this is the first report of an aortic graft infection with *B henselae*. Although the TEE did not detect vegetations, the ^{18}FDG-PET/CT scan confirmed our clinical suspicion of prosthetic valve endocarditis and graft infection [1, 7]. Most aortic graft infections [8] and almost all cases of *B henselae* prosthetic valve endocarditis require surgical intervention [9–14]. One previous report describes using a 30-month course of antibiotics to cure in a woman with prosthetic valve endocarditis due to *B henseale* [6]. The authors used serology to both identify the pathogen and to monitor the patient's response to treatment.

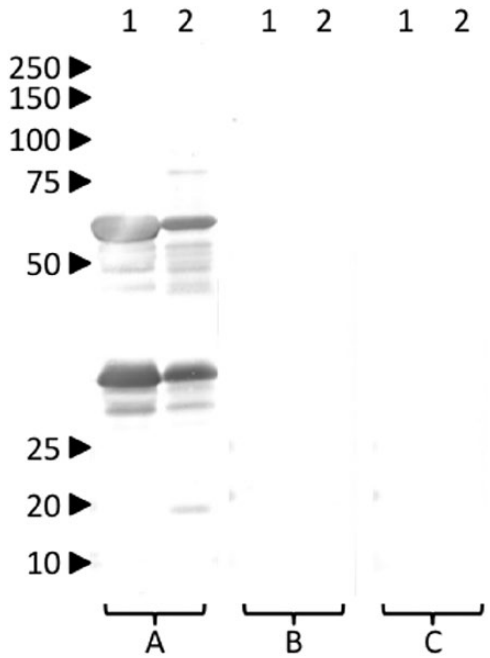

Figure 2. Western immunoblot of the patient's serum, analysed using *Bartonella quintana* (lane 1) and *Bartonella henselae* (lane 2) antigens. Molecular masses (in kilodaltons) are indicated on the left of the panel. The immunoblots were performed with untreated serum (A), serum adsorbed with *B quintana* (B), and serum adsorbed with *B henselae* as previously described (C) [4].

Given the number of uncommon pets, our patient had the potential for exposure to several zoonotic pathogens. Three distinct molecular assays identified the pathogen as *B henselae*. Polymerase chain reaction/ESI-MS offers the advantage of a rapid molecular test that offers sensitive and specific identification of pathogens. Quantitative PCR on the 16S-23S intergenic region and Western immunoblots enabled specific identification among *Bartonella* spp [4]. During his hospitalization, the patient reported that 2 of the cats had recently died, raising the possibility that one of them may have been the source of his *B henselae* infection [15].

CONCLUSIONS

In our patient with aortic graft infection and prosthetic valve endocarditis caused by *B henselae*, rapid molecular testing on blood samples permitted early initiation of pathogen-specific antimicrobial therapy, which helped obviate the need for surgical intervention.

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Disclaimer. Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written content is available for review by the Editor-in-Chief of this journal.

The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health (NIH).

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All authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Conflicts that the editors consider relevant to the content of the manuscript have been disclosed.

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