



HAL
open science

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

Patricia Bartley, Emmanouil Angelakis, Didier Raoult, Rangarajan Sampath,
Robert A. Bonomo, Robin L. P. Jump

► **To cite this version:**

Patricia Bartley, Emmanouil Angelakis, Didier Raoult, Rangarajan Sampath, Robert A. Bonomo, et al.. Prosthetic Valve Endocarditis Caused by *Bartonella henselae*: A Case Report of Molecular Diagnostics Informing Nonsurgical Management. *Open Forum Infectious Diseases*, 2016, 3 (4), pp.ofw202. 10.1093/ofid/ofw202 . hal-01455786

HAL Id: hal-01455786

<https://hal.science/hal-01455786v1>

Submitted on 5 Jul 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

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

Patricia Bartley,¹ Emmanouil Angelakis,³ Didier Raoult,³ Rangarajan Sampath,⁴ Robert A. Bonomo,^{1,2,5} and Robin L. P. Jump^{1,5}

¹Division of Infectious Diseases and HIV Medicine, Department of Medicine, and

²Departments of Pathology, Pharmacology, and Molecular Biology and Microbiology and Biochemistry, Case Western Reserve University School of Medicine, Cleveland, Ohio;

³Aix-Marseille Université, Marseille, France; ⁴Ibis Biosciences, Inc., Carlsbad, California;

⁵Geriatric Research Education and Clinical Center, Louis Stokes Cleveland Department of Veterans Affairs Medical Center, Cleveland, Ohio

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 anuloplasty 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 the 16S-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 anuloplasty 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.

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 $9.7 \times 10^3/\mu\text{L}$ 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 $100 \times 10^3/\mu\text{L}$. A transesophageal echocardiogram (TEE) did not reveal any valvular lesions or vegetations. A whole body ¹⁸fluorodeoxyglucose-positron emission tomography/computed tomography (¹⁸FDG-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.

Received 31 July 2016; accepted 19 September 2016.

Correspondence: Robin L. P. Jump MD, PhD, GRECC 1110(W), Louis Stokes Cleveland VA Medical Center, 10701 East Blvd., Cleveland, Ohio 44106 (robinjump@gmail.com).

Open Forum Infectious Diseases®

Published by Oxford University Press on behalf of the Infectious Diseases Society of America 2016. This work is written by (a) US Government employee(s) and is in the public domain in the US.

DOI: 10.1093/ofid/ofw202

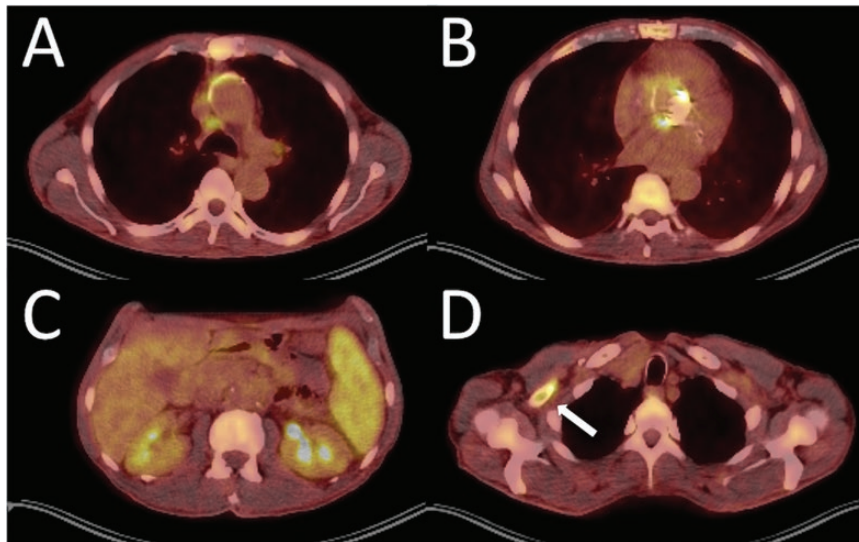


Figure 1. Images obtained using a ^{18}F fluorodeoxyglucose-positron emission tomography/computed tomography scan showing abnormal hypermetabolic activity in the aortic arch (A), aortic root/valve prosthesis (B), spleen (C), and axillary region of the right subclavian artery (D).

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}F 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. henselae* [6]. The authors used serology to both identify the pathogen and to monitor the patient's response to treatment.

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.

Acknowledgments

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.

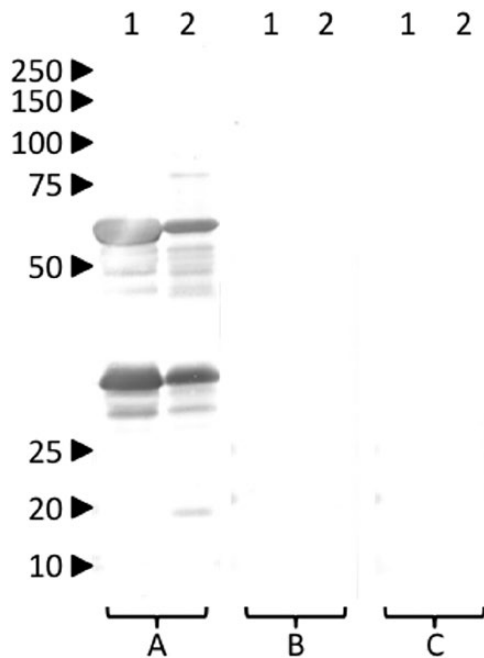


Figure 2. Western immunoblot of the patient's serum, analysed using *Bartonella quintana* (lane 1) and *Bartonella henselae* (lane 2) antigens. Molecular masses (in kilodaltons) are indicated on the left of the panel. The immunoblots were performed with untreated serum (A), serum adsorbed with *B. quintana*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

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

Financial support. Research reported in this publication was supported in part by the NIH, through the National Institute of Allergy and Infectious Diseases (Grants R01AI100560, R01AI063517, and R01AI072219; to R. A. B.), and the Clinical and Translational Science Collaborative of Cleveland (Grant UL1TR000439) from the National Center for Advancing Translational Sciences component of the NIH and NIH Roadmap for Medical Research (to R. L. P. J.). This study was also supported in part by funds and/or facilities provided by the Cleveland Department of Veterans Affairs, the Veterans Affairs Merit Review Program (Award 1I01BX001974 [to R. A. B.]), and the Geriatric Research Education and Clinical Center VISN 10 (to R. A. B. and R. L. P. J.). R. L. P. J. gratefully acknowledges the T. Franklin Williams Scholarship for funding provided by Atlantic Philanthropies, Inc., the John A. Hartford Foundation, the Association of Specialty Professors, the Infectious Diseases Society of America, and the National Foundation for Infectious Diseases.

Potential conflicts of interest. R. A. B. is an investigator/recipient of grants from AstraZeneca, Merck, and Rib-X (Melinta) and on Data Safety Board of TetraPhase. R. L. P. J. is an investigator/recipient of grants from Pfizer.

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.

References

1. Saby L, Laas O, Habib G, et al. Positron emission tomography/computed tomography for diagnosis of prosthetic valve endocarditis: increased valvular 18F-fluorodeoxyglucose uptake as a novel major criterion. *J Am Coll Cardiol* **2013**; 61:2374–82.
2. Bacconi A, Richmond GS, Baroldi MA, et al. Improved sensitivity for molecular detection of bacterial and *Candida* infections in blood. *J Clin Microbiol* **2014**; 52:3164–74.
3. Edouard S, Nabet C, Lepidi H, et al. *Bartonella*, a common cause of endocarditis: a report on 106 cases and review. *J Clin Microbiol* **2015**; 53:824–9.
4. Houplikian P, Raoult D. Western immunoblotting for *Bartonella endocarditis*. *Clin Diagn Lab Immunol* **2003**; 10:95–102.
5. Rolain JM, Brouqui P, Koehler JE, et al. Recommendations for treatment of human infections caused by *Bartonella* species. *Antimicrob Agents Chemother* **2004**; 48:1921–33.
6. Lesprit P, Noël V, Chazouillères P, et al. Cure of *Bartonella endocarditis* of a prosthetic aortic valve without surgery: value of serologic follow-up. *Clin Microbiol Infect* **2003**; 9:239–41.
7. Sah BR, Husmann L, Mayer D, et al. Diagnostic performance of 18F-FDG-PET/CT in vascular graft infections. *Eur J Vasc Endovasc Surg* **2015**; 49:455–64.
8. Lawrence PF. Conservative treatment of aortic graft infection. *Semin Vasc Surg* **2011**; 24:199–204.
9. Vikram HR, Bacani AK, DeValeria PA, et al. Bivalvular *Bartonella henselae* prosthetic valve endocarditis. *J Clin Microbiol* **2007**; 45:4081–4.
10. Karris MY, Litwin CM, Dong HS, Vinetz J. *Bartonella henselae* infection of prosthetic aortic valve associated with colitis. *Vector Borne Zoonotic Dis* **2011**; 11:1503–5.
11. Idrees J, Albacker TB, Gordon SM, et al. *Bartonella* infective endocarditis of a prosthetic aortic valve with a subvalvular abscess. *J Card Surg* **2011**; 26:483–5.
12. Abandeh FI, Bazan JA, Davis JA, et al. *Bartonella henselae* prosthetic valve endocarditis in an adult patient with congenital heart disease: favorable outcome after combined medical and surgical management. *J Card Surg* **2012**; 27:449–52.
13. Hajj-Chahine J, Houmaida H, Plouzeau C, et al. *Bartonella* as a cause of mechanical prosthetic aortic root endocarditis. *Ann Thorac Surg* **2012**; 93:e93–5.
14. Gouriet F, Fournier PE, Zaratzian C, et al. Diagnosis of *Bartonella henselae* prosthetic valve endocarditis in man, France. *Emerg Infect Dis* **2014**; 20:1396–7.
15. Centers for Disease Control and Prevention (CDC). *Bartonella* Infection (Cat Scratch Disease, Trench Fever, and Carrión's Disease). For Veterinarians. Available at: <http://www.cdc.gov/bartonella/veterinarians/>. Accessed 27 May 2016.