

## Case Report

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# Cardiobacterium Hominis Endocarditis of Bioprosthetic Pulmonic Valve: Case Report and Review of Literature

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## Introduction

*Cardiobacterium hominis* is a gram-negative rod and is an uncommon cause of infective endocarditis. Here we report the first published case description of *C. hominis* endocarditis of the pulmonic valve homograft in a patient who had previously undergone the Ross procedure.

## Case Presentation

The patient is a twenty year old Caucasian male who was born with coarctation of aorta, patent ductus arteriosus, Ventricular Septal Defect (VSD) and subaortic/aortic valvular disease. He had repair of the coarctation and ligation of the ductus arteriosus at the age of three weeks. At eighteen months of age, VSD repair and modified Konno procedure (left ventricular septoplasty with preservation of the aortic valve) were performed. His aortic valve remained stenotic and he underwent balloon dilatation twice (at the age of three and ten) which was ineffective. He subsequently had replacement of the aortic valve with a pulmonary autograft (Ross procedure) done at the age of eleven. He did well after this and did not have any problems into his adult life. The patient had deep dental cleaning done six weeks prior to admission and did receive oral amoxicillin prophylaxis (2 g orally) at the time. He presented to the hospital with a three week history of low grade fevers, decreased appetite, weight loss of about 10 pounds and a rash to his lower extremities. Upon examination, patient had a temperature of 100°F; rest of his vital signs was normal. Cardiac examination revealed a grade III systolic ejection murmur (old) and a grade III diastolic murmur (new), both best heard along the left sternal border. In addition, he had mild splenomegaly and a scattered, erythematous, macular, predominantly non-blanching rash to his lower extremities bilaterally (Figure 1). Blood cultures showed gram-variable rods on Gram staining (Figure 2) and grew *Cardiobacterium hominis*, sensitive to ampicillin and ceftriaxone. Four sets of blood cultures, drawn over a period of four days, were positive. (It took about three days for the cultures to become positive). Chest radiograph did not show any abnormalities. A trans-

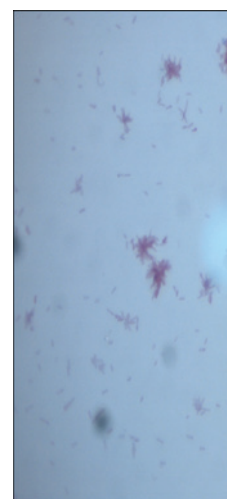
esophageal echocardiogram revealed the pulmonary homograft with multiple echodensities consistent with vegetations (Figure 3). There was moderate to severe pulmonary stenosis and moderate regurgitation. The neo-aortic valve did not reveal any vegetation. The patient did not meet any criteria for surgical intervention, and improved clinically with medical management. He was discharged home on intravenous ceftriaxone (2 g q 24 hours), which he received for about four weeks but then became intolerant of it (with skin rash, nausea and leukopenia), and was switched to intravenous ciprofloxacin 400 mg q 12 hours (to which the isolate was sensitive, with an MIC of 0.25), to complete six weeks of treatment. The patient did fairly well subsequently and a repeat echocardiogram showed slight improvement with moderate pulmonic stenosis and mild to moderate regurgitation. No surgical intervention was thought necessary by his cardiologist and he continues to be followed clinically and echocardiographically.

## Discussion

*Cardiobacterium hominis* is a fastidious, gram-negative coccobacillary organism which is one of three genera in the family *Cardiobacteriaceae* (*Cardiobacterium*, *Dichelobacter* and *Suttonella*). Within the genus *Cardiobacterium* are two species-*hominis* and



**Figure 1:** Skin rash to lower extremities.



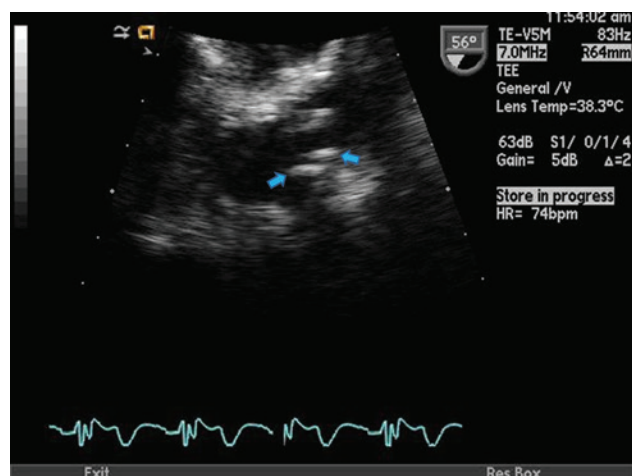
**Figure 2:** Gram stain of blood culture showing Gram-variable rods.

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**Received** May 23, 2013; **Accepted** June 21, 2013; **Published** June 24, 2013

**Citation:** Fazili T, Endy T, Javaid W, Amin M (2013) *Cardiobacterium Hominis* Endocarditis of Bioprosthetic Pulmonic Valve: Case Report and Review of Literature. J Clin Case Rep 3: 286. doi:[10.4172/2165-7920.1000286](https://doi.org/10.4172/2165-7920.1000286)

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**Figure 3:** Transesophageal echocardiogram showing pulmonic valve homograft with vegetations.

*valvarum*. *C. hominis* is grouped as part of the HACEK organisms (*Haemophilus* species, *Actinobacillus actinomycetemcomitans*, *C. hominis*, *Eikenella corrodens* and *Kingella* species). These organisms are relatively uncommon causes of infective endocarditis with an incidence of about 5% [1]. We found only sixty seven reported cases of *C. hominis* infective endocarditis in the English literature. We believe that our patient represents the first published case of *C. hominis* endocarditis of the pulmonic valve homograft in a patient having undergone the Ross procedure.

*Cardiobacterium* species was first recognized as a cause of endocarditis in 1962 [2]. It was designated a Group II organism initially and named *C. hominis* subsequently. *C. hominis* is a fastidious, pleomorphic, gram-negative bacillus that can appear as rosettes, pairs or short chains [3]. The organism has a predilection to retain crystal violet stain on Gram staining at one or both ends, making its appearance gram-variable (as in our patient). It behaves like a facultative anaerobe, growing best in a humid, high CO<sub>2</sub> environment [4]. Therefore, in a patient with bacteremia with gram-variable rods who has clinical and echocardiographic evidence of endocarditis, *C. hominis* should be strongly suspected and appropriate antibiotics promptly started. *C. hominis* is a member of the normal oral flora in most healthy individuals and might be a colonizer of the gastrointestinal tract as well [5]. The risk factors for endocarditis include poor dentition, recent dental work, rheumatic and congenital heart disease, and presence of a prosthetic valve [6]. The risk factors in our patient were recent dental work, congenital heart disease and surgery for it, and two operated valves (the pulmonary autograft in the aortic position and the pulmonary homograft in the pulmonic position).

An extensive review of sixty one cases of infective endocarditis due to *C. hominis* was recently published [7]. The mean age of the patients was 50 years, with a male to female ratio of approximately 2:1. The mean duration of symptoms was 138 days, with 21% of patients having had symptoms for more than 200 days. The predominant symptoms include fever, malaise, weight loss and anorexia. The aortic and the mitral valves were involved in 39% and 31% of patients respectively. Prosthetic valve endocarditis was seen in 17 patients (28%). The most common physical findings were murmur (94%), embolic lesions (51%) and splenomegaly (40%). The most frequent complications were congestive heart failure (40%), central nervous system emboli (21%) and arrhythmias (16%).

Valve replacement was necessary in 27 patients (45%) of the patients-20 with native valve infection and 7 with prosthetic valve infection. The overall cure rate was 93%.

The overall prognosis of endocarditis due to *C. hominis* is quite favorable, despite the frequent need for valve replacement. Penicillin along with an aminoglycoside used to be the therapy of choice and was the most frequently used regimen in the above mentioned review [8]. There have been recent reports of  $\beta$ -lactamase-producing isolates, with high minimal inhibitory concentration to penicillin and ampicillin [8]. As a result, the American Heart Association (AHA) now recommends ceftriaxone (2 g i.v. every 24 hours) as the drug of choice. Alternative therapies per the AHA are ampicillin-sulbactam (3 g i.v. every 6 hours) or Ciprofloxacin (400 mg i.v. every 12 hours) [9]. The European Society of Cardiology recommends ceftriaxone or a combination of ampicillin (2 g every 4 hours) and gentamicin (1 mg/kg every 8 hours), or ciprofloxacin. The recommended duration of antibiotics is 4 weeks for a native valve and 6 weeks for a prosthetic valve.

For prophylaxis of infective endocarditis during dental procedures in high risk patients (like ours), the AHA recommends oral amoxicillin as a single dose of 2 g [10]. This might need to be revisited in light of penicillinase production by organisms of the oral flora, especially the HACEK group, as evidenced by development of endocarditis in our patient despite receiving oral amoxicillin prophylaxis. Amoxicillin-clavulanate might be a better option in view of its  $\beta$ -lactamase inhibitor activity. For the penicillin-allergic patient, the AHA recommends single dose clindamycin 600 mg orally or parenterally [10].

In conclusion, endocarditis can occur after the Ross procedure and members of the HACEK group, including *C. hominis*, need to be considered in the differential. Ceftriaxone is the drug of choice for this group of organisms and amoxicillin-clavulanate might be a better drug than amoxicillin for prophylaxis.

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