FEATURED CLINICAL CASE

Late aortic homograft valve endocarditis caused by *Cardiobacterium hominis*: a case report and review of the literature

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Abstract

An unusual case of *Cardiobacterium hominis* endocarditis involving an aortic homograft valve is presented. Although the patient was young (a 17 year old man) and showed few of the characteristic features of the disease, the report does illustrate a number of the problems associated with this illness and highlights the need for the careful assessment of apparent culture negative endocarditis. The organism itself is susceptible to most antibiotics but further treatment, including surgery, may be necessary. Patients must therefore be examined repeatedly and assessed for haemodynamic deterioration, valve destruction or embolic phenomena. Homograft valve replacement may offer some benefits in the setting of aortic valve endocarditis and is therefore an attractive option in this situation.

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Cardiobacterium hominis is a small, Gram negative coccobacillus, which is part of the normal human oropharyngeal flora. The organism is an unusual cause of human disease, but as its identification requires special media and prolonged incubation, it is notorious for causing apparently culture negative endocarditis. We report a case of infective endocarditis caused by *C hominis* in an adolescent male who had previously undergone aortic valve homograft replacement for congenital aortic stenosis and whose management was further complicated by the absence of traditional, inflammatory markers for the disease.

Case report

A 17 year old man was admitted with a three week history of lethargy and night sweats. He had previously undergone a balloon valvuloplasty at 7 years of age for congenital aortic stenosis, followed by a successful aortic valve replacement using a 20 mm homograft at the age of 15 years. He had remained well until his presenting illness, but had been treated with amoxycillin by his general practitioner for a bronchopulmonary infection immediately be-

fore admission, and had undergone dental treatment with appropriate antibiotic prophylaxis some months previously.

On examination he had no fever, with no stigmata of endocarditis, although a new, early diastolic murmur was easily audible at the lower left sternal edge in addition to a long standing ejection systolic murmur. At that time his erythrocyte sedimentation rate (ESR) was 4 mm in the first hour, C reactive protein (CRP) was undetectable, and full blood count, urine analysis and blood urea and electrolytes were all normal. The ECG showed normal sinus rhythm and left ventricular hypertrophy by voltage criteria.

An echocardiogram revealed a large, sessile vegetation on the non-coronary cusp of the homograft, which was clearly seen to prolapse into the left ventricular cavity during diastole. There was significant aortic incompetence with a broad jet of turbulent flow extending to the apex on colour Doppler with a forward velocity of 3.3 m/s across the valve. The left ventricular cavity was slightly dilated with an end diastolic diameter of 60 mm although the systolic function remained reasonable with a shortening fraction of 39% (fig 1).

A series of 12 blood cultures was taken before starting empirical treatment with intravenous ceftrioxone and gentamicin. After three days of incubation, a Gram negative bacillus was found in seven of these cultures, which was subsequently identified as *C hominis*. All subse-

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Figure 1 Parasternal long axis view of aortic valve in systole with large sessile vegetation (arrowed). AO, ascending aorta; LV, left ventricle; LA, left atrium.

Table 1   *Previous reports of prosthetic valve cardiobacterium hominis endocarditis*

Author	Valve type	Valve position(s)	Antibiotic treatment	Outcome	Survival at follow up
Wormser *et al* 1978[6]	Autologous fascia lata	Aortic	Penicillin/gentamicin 10 days Ampicillin + Tobramycin 4 weeks	Bjork-Shiley AVR (heart failure/embolic disease)	9 months
Geraci *et al* 1978[8]	Bjork-Shiley	Aortic	Ampicillin 4 weeks	AVR (?type)	6 months
Spernoga *et al* 1979[7]	Porcine Xenograft	Mitral	Ampicillin 6 weeks	Bacteriological cure	nr
Prior *et al* 1979[8]	Starr-Edwards	Mitral	Penicillin 6 weeks	Bacteriological cure	6 months
Jolie *et al* 1986[9]	Cooley-Bloodwell disc	Mitral	Ampicillin/ gentamicin 3 weeks Ampicillin 3 weeks	Bacteriological cure	1 month
Bellorini *et al* 1987[10]	Bjork-Shiley	Aortic	Ampicillin/ gentamicin 6 weeks	Bacteriological cure	nr
Pritchard *et al* 1991[11]	Carpentier-Edwards bioprosthesis	Aortic	Penicillin/gentamicin? duration Ceftriaxone 6 weeks	Carpentier- Edwards AVR (2° heart block and root abscess)	18 months
Taveras *et al* 1993[12]	Porcine Xenograft	Mitral and Aortic	Ampicillin/ gentamicin 1 week Ampicillin 6 weeks	St Jude AVR and MVR (heart failure)	5 months
Marques *et al* 1995[13]	Starr- Edwards	Mitral and Aortic	Ampicillin/ gentamicin 6 weeks	Bacteriological cure	12 weeks
Lin *et al* 1995[14]	Bjork-Shiley	Aortic	Ceftriaxone 20 days	Bacteriological cure (intracranial mycotic aneurysm)	nr

AVR, aortic valve replacement; nr, not reported; MVR, mitral valve replacement.

quent blood cultures were reported as negative. The intravenous treatment was continued for 18 days before changing to oral amoxycillin, to which the organism was sensitive. The patient's symptoms improved quickly and he remained without fever throughout with repeatedly normal ESR, CRP, complement fractions, and white cell counts.

It was decided that further elective aortic valve replacement was required both on the grounds of continuing left ventricular volume load and the appearance of the vegetation on ultrasound. At surgery, after six weeks of antibiotic treatment, the homograft was found to be friable with multiple perforations although no vegetations were identified. The aortic root was replaced using a 22 mm homograft with reimplantation of the coronary arteries, and the patient made an uneventful recovery without embolic phenomena. The excised graft underwent prolonged culture but subsequent bacteriological examination showed no growth. The patient was discharged from hospital on amoxycillin for a further four weeks and was well 18 months after the procedure.

Discussion

C hominis is a fastidious, Gram negative bacillus, which is present as normal flora of the oropharynx in most individuals.[1] The organism is facultatively anaerobic and is difficult to isolate from standard media without optimum growth conditions that include CO_2 enrichment and 100% humidity.[2] It may be distinguished from other, closely related HACEK bacilli (*Haemophilus* species, *Actinobacillus actinomycetemcomitans, Eikenella corrodens,* and *Kingella kingii*) by a positive oxidase reaction and the production of indole. However, blood cultures may take up to 14 days' incubation before becoming positive, and the determination of minimal inhibitory antibiotic concentrations using standard techniques remains problematic.[3]

The organism is rarely the cause of human infection but was named when it was first isolated from four patients with infective endocarditis in 1962.[4] Since then, fewer than 50 cases of *C hominis* endocarditis have been reported in

the literature. Although most of these cases have had some form of pre-existing cardiac disease,[5] only 10 cases involving prosthetic valves have been described to date, including four patients with tissue prostheses although *C hominis* homograft endocarditis has not been described previously (table).

The illness has a characteristically insidious onset, occasionally with symptoms lasting as long as nine months before diagnosis.[15] A history of dental manipulation may be elicited, although for most cases no portal for entry can be identified.[5] Patients are often middle aged and may be feverish, but the fever is often low grade.[9] Stigmata of endocarditis such as splenomegaly, anaemia, and haematuria are usually present particularly in those with prolonged illnesses, and the ESR is, typically, moderately raised.[5] Other positive serological investigations such as rheumatoid factor or non-treponemal tests for syphilis may be misleading in the context of apparently sterile blood cultures.[3 16-18]

C hominis tends to form large, friable vegetations which are associated with a significant risk of cerebral embolisation (around 30% of cases)[5] or mycotic aneurysm formation (around 10%),[19] both of which appear to be more common than with other Gram negative endocarditides.[5] Right sided endocarditis is rare, but was associated with a fatal pulmonary embolism in a single reported case.[3] Symptomatic heart failure has required valve replacement in up to a quarter of patients with the disease[5] and this may also be required to prevent embolic sequelae.[19]

The organism is almost always susceptible to penicillin, and most cases of *C hominis* endocarditis may be successfully treated with a three week course of antibiotics using either amoxycillin alone or in combination with an aminoglycoside.[5] However, resistance to erythromycin and vancomycin has been reported[8] and these agents should not be considered appropriate empirical treatment for patients who are allergic to penicillin unless there is good evidence of sensitivity in vitro.[18] Definitive differentiation from other members of the HACEK group is also essential, particularly as

Actinobacillus actinomycetemcomitans and *Haemophilus aphrophilus* may be penicillin resistant.

Our patient received oral amoxycillin for a presumed bronchopulmonary infection just before admission and as prophylaxis for dental treatment three months earlier. Despite this, we were able to isolate *C hominis* in blood cultures within three days. His presentation was unusual in that he was young and had none of the usual clinical features or serological markers of infective endocarditis. Although subsequent blood cultures were sterile, it was difficult to monitor his progress other than by symptoms and with repeated echocardiography.

Four of the 10 previously reported cases of *C hominis* prosthetic valve endocarditis have required valve re-replacement on account of haemodynamic compromise or to prevent embolic complications.[3 6 11 12] As such, without other markers and despite an apparent bacteriological cure, it was felt appropriate, in this case, to proceed to urgent surgery given the echocardiographic findings, which indicated a high risk of embolisation. However, the use of "early" surgery during the active phase of infective endocarditis has to be balanced with the added risk of prosthetic valve infection and, therefore, intervention took place at the end of the six week course of antibiotics when it was considered that the valve was most likely to be sterile.

Homograft valves can be inserted either in a subcoronary position or as a complete aortic root replacement. In the presence of recent bacterial endocarditis, it is often necessary to remove the native aortic root completely and unroof all apparently "healed" left ventricular outflow tissue.[20] This is best achieved by performing aortic root replacement which, although a more demanding procedure than simple subcoronary valve implantation, may be to the patient's long term benefit.[21 22]

The greatest risk of recurrent endocarditis following valve replacement for ongoing native or prosthetic valve infection appears to occur within the first three months of operation[23] and early mechanical valve dehiscence has been reported as a complication of *C hominis* endocarditis.[12] At the same time, a number of reports[24-26] suggested that this early peaking hazard phase is greater for mechanical and xenograft valves than for homografts used in the aortic position.[23 27 28] This may be caused by an intrinsic biological resistance to infection, although homografts do have a constant and low risk for endocarditis.[27 28] For these reasons, and partly at the specific request of the patient, a further homograft was used successfully in this case.

1 Slotnick IJ, Dougherty M. Further characterisation of an unclassified group of bacteria causing endocarditis in man: Cardiobacterium hominis gen. et sp.n. Antonie von Leeuwenhoek 1964;**30**:261–72.
2 Das M, Badley AD, Cockerill FR, *et al*. Infective endocarditis caused by HACEK micro-organisms. *Annu Rev Med* 1997;**48**:25–33.
3 Geraci JE, Greipp PR, Wilkowske CJ, *et al*. Cardiobacterium hominis endocarditis: four cases with clinical and laboratory observations. *Mayo Clin Proc* 1978;**53**:49–53.
4 Tucker DN, Slotnick IJ, King EO, *et al*. Endocarditis caused by a Pasteurella-like organism: report of four cases. *N Engl J Med* 1962;**267**:913–16.
5 Wormser GP, Bottone EJ. Cardiobacterium hominis: review of microbiologic and clinical features. *Reviews Infect Dis* 1983;**5**:680–91.
6 Wormser GP, Bottone EJ, Tudy J, *et al*. Cardiobacterium hominis: review of prior infections and report of endocarditis on a fascia lata prosthetic heart valve. *Am J Med Sci* 1978;**276**:117–26.
7 Spernoga JF, Laskowski L, Marr JJ, *et al*. Cardiobacterium hominis endocarditis. *South Med J* 1979;**72**:85–87.
8 Prior RB, Spagna VA, Perkins RL. Endocarditis due to a strain of Cardiobacterium hominis resistant to erythromycin and vancomycin. *Chest* 1979;**75**:85–86.
9 Jolie A, Gnann JW. Cardiobacterium hominis causing late prosthetic valve endocarditis. *South Med J* 1986;**79**1461–62.
10 Bellorini M, Mackhoul N, Loiret J, *et al*. Endocardite—a Cardiobacterium hominis sur prothese valvulaire aortique. *Arch Mal Coeur Vaies* 1987;**5**:663–65.
11 Pritchard TM, Foust RT, Cantlley JR, *et al*. Prosthetic valve endocarditis due to Cardiobacterium hominis occurring after upper gastrointestinal endoscopy. *Am J Med* 1991;**90**:516–18.
12 Taveras JM III, Campo R, Segal N, *et al*. Apparent culture negative endocarditis of the prosthetic valve caused by Cardiobacterium hominis. *South Med J* 1993;**86**:1439–40.
13 Marques MT, Barreira R, Almeida M, *et al*. Prosthetic valve endocarditis diagnosed in Portugal. *Ann Biol Clin* 1995;**53**:299–300.
14 Lin BHJ, Vieco PT. Intracranial mycotic aneurysm in a patient with endocarditis caused by Cardiobacterium hominis. *Can Assoc Radiol J* 1995;**46**:40–42.
15 Savage DD, Kagan RL, Young NA, *et al*. Cardiobacterium hominis endocarditis: description of two patients and characterisation of the organism. *J Clin Microbiol* 1977;**5**:75–80.
16 Perdue GD, Dorney ER, Ferrier F. Embolomycotic aneurysm associated with bacterial endocarditis due to Cardiobacterium hominis. *Am Surg* 1968;**34**:901–04.
17 Ellner JJ, Rosenthal MS, Lerner PI, *et al*. Infectious endocarditis caused by slow-growing, fastidious, gram-negative bacteria. *Medicine (Baltimore)* 1979;**58**:145–58.
18 Lane T, McGregor R, Wright D, *et al*. Cardiobacterium hominis—an elusive cause of endocarditis. *J Infect* 1983;**6**:75–80.
19 Robison WJ, Vitelli AS. Infectious endocarditis caused by Cardiobacterium hominis. *South Med J* 1985;**78**:1020–21.
20 David TE. Surgical management of aortic root abscess. *J Card Surg* 1997;**12**(suppl 2):262–66.
21 Waszyrowski T, Kasprzak JD, Krzeminska-Pakula M, *et al*. Early and long-term outcome of aortic valve replacement with homograft versus mechanical prosthesis: 8 year follow up study. *Clin Cardiol* 1997;**20**:843–8.
22 Doty JR, Salazar JD, Liddicoat JR, *et al*. Aortic valve replacement with cryopreserved aortic allograft: ten year experience. *J Thorac Cardiovasc Surg* 1998;**115**:371–79.
23 McGiffin DC, Galbraith AJ, McLachlan GJ. Aortic valve infection: risk factors for death and recurrent endocarditis after aortic valve replacement. *J Thorac Cardiovasc Surg* 1992;**101**:511–20.
24 Glazier JJ, Verwilghen J, Donaldson RM, *et al*. Treatment of complicated prosthetic aortic valve endocarditis with annular abscess formation by homograft aortic root replacement. *J Am Coll Cardiol* 1991;**17**:1177–82.
25 Haydock D, Barratt-Boyes B, Macedo I, *et al*. Aortic valve replacement for active infectious endocarditis in 108 patients: a comparison of freehand allograft valves with mechanical prostheses and bioprostheses. *J Thorac Cardiovasc Surg* 1992;**103**:130–39.
26 Bedi HS, Farnsworth AE. Homograft aortic root replacement for destructive prosthetic endocarditis. *Ann Thorac Surg* 1993;**55**:386–88.
27 Kirklin JW, Barratt-Boyes BG. Aortic valve disease. In: Kirklin JW, Barratt-Boyes BG, eds. *Cardiac surgery*. New York: John Wiley, 1986:373–429.
28 Matsuki O, Robles A, Gibbs S, *et al*. Long-term performance of 555 aortic homografts in the aortic position. *Ann Thorac Surg* 1988;**46**:187–91.