Case Report

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Mechanical valve endocarditis caused by *Gemella morbillorum*

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As the usual pathogen spectrum of a late-onset (>12 month post-operatively) prosthetic valve endocarditis is similar to normal valve endocarditis, with the exception of coagulase-negative staphylococcus, a prosthetic valve endocarditis caused by unusual bacterial pathogens represents a therapeutic and diagnostic dilemma. The lack of well established criteria or clinical experience for the management of such infections makes therapy and prognosis difficult to determine. A case of successfully treated *Gemella morbillorum* prosthetic valve endocarditis and a review of the relevant literature are presented.

Introduction

Prosthetic valve endocarditis is a life-threatening infectious complication that is seen frequently in medical centres that routinely care for patients with artificial cardiac valves. Among all cases of infective endocarditis, prosthetic valve endocarditis makes up 16–32% (Fefer *et al.*, 2002). The pathogens usually found in a late-onset prosthetic valve endocarditis are basically the same as those found in normal valve endocarditis. The recovery of unusual micro-organisms like *Abiotrophia defectiva* or *Granulicatella* species (nutritionally variant viridans streptococci) or a HACEK group micro-organism (*Haemophilus parainfluenzae*, *Haemophilus aphrophilus*, *Actinobacillus* [*Haemophilus*] *actinomycetemcomitans*, *Cardiobacterium hominis*, *Eikenella* species and *Kingella*) species from blood cultures is so suggestive of endocarditis, including late-onset prosthetic valve endocarditis, that the mere appearance of these micro-organisms in multiple blood cultures strongly suggests prosthetic valve endocarditis (Bayer *et al.*, 1998).

Case report

A 37-year-old East Indian man with a history of congenital bicuspid aortic valve, and tilting valve mechanical prosthetic valve replacement 18 years prior, presented to the emergency department complaining of 10 days of chills and sweats associated with non-specific left upper quadrant abdominal pain. No other abdominal complaints were noted. He did not report any chest pain, dyspnoea, cough, weight loss or fever. He denied history of dental work, trauma or intravenous drug use. No history of cellulitis or cutaneous lesions was reported. His case history was otherwise unremarkable and his only medication was warfarin.

Examination revealed a well-looking young man in no acute distress. He was febrile with a temperature of 38.4 °C.

Head and neck examination revealed no conjunctival haemorrhages, petechiae or lesions of the oral cavity. No lymphadenopathy was noted. No splinter haemorrhages, Janeway lesions, Osler's nodes or cutaneous vasculitides were seen. Cardiac examination revealed a grade III pansystolic murmur and mechanical second heart sound. No diastolic murmur or rub was heard. Pulmonary examination revealed no abnormality. Abdominal examination showed a tender left upper quadrant with no guarding or rebound tenderness. Bowel sounds were normal. Neurological examination revealed no abnormality.

An electrocardiogram revealed normal sinus rhythm with no conduction abnormalities. Chest radiography revealed only the mechanical heart valve. A complete blood count revealed a white cell count of 9.3×10^6 cells l^{-1} with 17% band forms. His international normalized ratio was 2.3. All other blood parameters were normal and his chemistry was unremarkable. Computed tomography showed a 2×3 cm splenic infarct and small renal infarcts. A transthoracic echocardiogram showed only aortic valve incompetence and no vegetation. No mural or chamber abnormalities were noted. A subsequent transoesophageal echocardiogram demonstrated severe obstruction of the mechanical aortic valve with a transvalvular gradient of 80 mmHg and small aortic vegetation. No other valve abnormalities, nor pericardial effusion were noted, and left ventricular function and size were normal.

As the patient fulfilled one major and three minor Duke's criteria, empiric treatment of suspected endocarditis with vancomycin, gentamicin and rifampicin was started. Three sets of blood cultures taken on admission were reported as positive on the second day. Gram staining showed Gram-variable cocci organized into clusters. A rapid thermotolerance test was negative. Microbiological analysis of the isolate showed a slow-growing fastidious organism.

Colonies were visible on enriched media (chocolate agar or brucella agar with vitamin K) after 48 h incubation. Tiny colonies became visible only later on sheep's blood agar. MacConkey agars remained negative. The subcultured organism was a Gram-variable coccus with a streptococcal arrangement. The organism was catalase-negative and a rapid pyrylidonyl arylamidase (PYR) disc test was negative. A leucine aminopeptidase disc test and a bile aesculin test were also negative. Antimicrobial susceptibilities were determined by Etest (Medox Diagnostics) or Kirby-Bauer disc diffusion (Oxoid) and are shown in Table 1. An API 20 streptococcal identification system (bioMérieux) failed to identify the organism with sufficient confidence. Therefore, the organism was referred to the National Centre for Streptococcus at the Provincial Laboratory of Public Health for Northern Alberta, Edmonton, Canada, for 16S RNA sequence identification, and was found to have 97% sequence homology with *Gemella morbillorum* (GenBank accession no. L14327.1).

Based on the susceptibility data, vancomycin was discontinued and treatment with aqueous penicillin G (3×10^6 U every 4 h) was initiated. Two weeks of low dose gentamicin was given for synergism. Penicillin and rifampicin were continued for 6 weeks. The patient remains well 12 months post-treatment, with no relapse of infection. The source of bacteraemia in our patient was never determined.

Discussion

G. morbillorum, formally '*Streptococcus morbillorum*', is a catalase-negative, facultatively anaerobic Gram-positive to Gram-variable coccus that was first described in 1917 by Tunnicliff (Zakir *et al.*, 2004). In 1988, the organism was transferred to its present genus based on DNA homology, physiological properties and 16S RNA ribotyping (Kilpper-Balz & Schleifer, 1988). It is a natural inhabitant of the human oropharyngeal, gastrointestinal and urogenital flora. Isolates of *G. morbillorum* have been found in cases of soft-tissue abscesses (Pradeep *et al.*, 1997), meningitis (Garavelli, 1990), endocarditis (Zakir *et al.*, 2004; Wood, 1993; Akiyama *et al.*, 2001; Iglesias *et al.*, 1999; Ubada Ruiz

et al., 2000), septic shock (Vasishtha *et al.*, 1996) and septic arthritis (Wood, 1993).

Some 23 cases of endocarditis caused by *G. morbillorum* have been reported in the literature, with the vast majority involving native (nonprosthetic) valves. Predisposing factors have included poor dental hygiene, dental procedures, colon malignancies, inflammatory bowel disease and gastrointestinal diagnostic procedures. Underlying intra-cardiac lesions included pre-existing valvular lesions, congenitally bicuspid aortic valves, hypertrophic cardiomyopathy, cardiac myxoma and tetralogy of Fallot. The aortic, tricuspid and mitral valves have been affected (Akiyama *et al.*, 2001; Iglesias *et al.*, 1999; Terada *et al.*, 1994; Ubada Ruiz *et al.*, 2000; Vasishtha *et al.*, 1996; Al Soub *et al.*, 2003; Espinosa-Villarreal *et al.*, 2000; Farmaki *et al.*, 2000; Martin *et al.*, 1995; Woo *et al.*, 2003).

To the best of our knowledge, there have been only two previous reports of endocarditis due to *G. morbillorum* involving a prosthetic valve (Zakir *et al.*, 2004; Holland *et al.*, 1996) (Table 2) and one of the cases was associated with intravenous drug abuse. This is believed to be the second reported case of *G. morbillorum* endocarditis in an individual with a mechanical prosthetic valve who was not an intravenous drug user, although a case report of ball valve endocarditis in a non-intravenous drug user due to an unspciated *Gemella* has been reported (Ukimura *et al.*, 1998).

Significant clinical isolates of *G. morbillorum* reported in the literature have generally been highly sensitive to penicillin G and ampicillin (Bayer *et al.*, 1998; Garcia del Busto *et al.*, 1995). Nevertheless, more recent data suggest some emerging penicillin and macrolide resistance (Woo *et al.*, 2003; Signes-Costa *et al.*, 2000). In the majority of the reported cases of endovascular infections, bacteriological cure was achieved with a combination of penicillin and an aminoglycoside. In patients that were β -lactam allergic, or where the organism displayed *in vitro* resistance to penicillin, vancomycin or a combination of erythromycin and rifampicin has been effective (Martin *et al.*, 1995). Ceftriaxone has also been used to treat endocarditis caused by *G. morbillorum* (Zakir *et al.*, 2004). Both reported cases of bioprosthetic valve endocarditis were successfully treated with a β -lactam combined with an aminoglycoside (Table 2).

Conclusion

This case illustrates the importance of considering unusual organisms in the diagnosis of endocarditis and the potential difficulty in identifying them with the usual methods employed by microbiology laboratories. In this particular case, the identification of the organism proved to be difficult because of discordance between the organisms' biochemical characteristics and Gram stain, and those typical of *G. morbillorum*. In particular, the organism did not have the pyrylidonyl arylamidase and leucine

Table 1. Antimicrobial susceptibilities of *G. morbillorum* isolated from the patient's blood

Antimicrobial agent	MIC by Etest ($\mu\text{g ml}^{-1}$)	Diameter by Kirby-Bauer test	Interpretation*
Penicillin	0.023		Sensitive
Cefotaxime	<0.016		Sensitive
Erythromycin		28 mm	Sensitive
Vancomycin		32 mm	Sensitive

*Clinical and Laboratory Standards Institute interpretative criteria for susceptibility are not available for this organism. Most authorities recommend using the interpretive criteria for streptococci other than *Streptococcus pneumoniae* (Ruoff, 2003).

Table 2. Reported cases of prosthetic valve endocarditis caused by *G. morbillorum*

Age (years)	Gender	Type of valve	Risk factor	Treatment	Reference
44	Male	Mitral bioprosthetic	IVDU, HIV	Ceftriaxone for 4 weeks + gentamicin for 2 weeks	Zakir <i>et al.</i> (2004)
84	Female	Mitral and aortic porcine	None	Penicillin G for 6 weeks + gentamicin for 2 weeks	Holland <i>et al.</i> (1996)
37	Male	Mechanical aortic	None	Penicillin G and rifampicin for 6 weeks + gentamicin for 2 weeks; valve replacement	This study

HIV, Human immunodeficiency virus; IVDU, intravenous drug user.

aminopeptidase activities typical of *Gemella* species. This may be a result of the organisms' slow growth and the use of the more convenient and rapid disc test employed in many laboratories. Although species identification may not be necessary to the early management of endocarditis, susceptibilities should be determined as soon as possible because some organisms causing endocarditis may be inherently resistant to empiric regimens. In particular, *Leuconostoc*, *Pediococcus* and *Lactobacillus* species all have inherent resistance to vancomycin. Ultimately, identification of the organism causing endocarditis should be pursued, since disease prognosis, the source of the infecting organism and interpretation of susceptibility may depend on it.

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