Case Report

Fatal Endocarditis Caused by *Arcanobacterium haemolyticum*: Case Report and Review of the Literature

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Introduction

Arcanobacterium haemolyticum (formerly *Corynebacterium haemolyticum*) is a gram-positive bacillus that is mainly implicated in pharyngitis and skin infections. Most of these infections occur in the adolescent age group, sometimes mixed with other pathogens. This microorganism is sometimes overlooked in the clinical microbiology laboratory because it is rare. The colonies may be dismissed as insignificant or misidentified as *Streptococcus* or *Corynebacterium* species, resulting in a missed or delayed diagnosis. Endocarditis is rarely caused by the bacterium and has been reported in only three cases in the literature. In this case report, we present a fatal case of endocarditis associated with a congenital bicuspid aortic valve. We also describe the laboratory methods used for the identification of the organism, together with a brief review of the literature on reported cases of *A. haemolyticum* infection.

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Case Report

A 39-year-old obese female with a past medical history significant for hypertension, non-insulin-dependent diabetes mellitus, depression, and atherosclerotic cardiovascular disease was seen by her primary care physician for flulike symptoms. She was diagnosed with sinusitis and bronchitis and was given oral azithromycin. A few days later, she developed sudden onset of dyspnea, tachypnea, and agitation. Cardiac monitoring performed en route by emergency medical services revealed supraventricular tachycardia with a rate of 170 beats per min. She soon went into cardiac arrest. The resuscitation effort briefly continued in the emergency department before she was pronounced dead approximately 1 h after the onset of her symptoms. No antemortem laboratory tests or radiographic procedures were performed. On the basis of her family's request, an autopsy was performed. The patient was a smoker (half-pack per day), but there was no history of alcohol abuse or intravenous drug use. She lived with her boyfriend and 5 children (ages 13 to 21). She had a strong family history of hypertension and atherosclerotic cardiovascular disease.

Postmortem gross examination of the cardiovascular system revealed an enlarged heart (530 g) consistent with the history of hypertension. The visceral pericardium exhibited a thick fibrinopurulent exudate consistent with pericarditis. The aortic valve was bicuspid with a large, bulky, soft, tan vegetation attached to the ventricular side of the anterior cusp (Fig. 1). There was a full-thickness perforation at the base of the cusp, allowing communication across the valve leaflet. Posterior to and communicating with the perforation was an abscess cavity within the myocardium of the left ventricular outflow tract. The cavity exhibited ragged margins and measured approximately 18 mm in diameter. Multiple sections of the lungs revealed congestion and edema without evidence of focal consolidation. The liver was fatty and enlarged, with a smooth capsular surface and rounded margins. The inferior pole of the left kidney contained a 5-mm brown-red granular calculus. The skin was intact

  0196-4399/00 (see frontmatter)

without evidence of any lesions. The teeth were natural and in good repair. The upper airway was unobstructed, and the tongue was unremarkable, as were the mucosal surfaces of the oropharynx. The remainder of the gross examination was noncontributory.

Histological examination of the lungs showed intra-alveolar and intra-septal proteinaceous fluid, marginating polymorphonuclear cells in the vasculature, and scattered aggregates of pigment-laden intra-alveolar macrophages. Patchy anthracotic pigment deposition was seen. The liver showed severe macrovesicular steatosis and patchy mild-to-moderate, nonspecific chronic portal inflammation. The kidney showed areas of chronic interstitial inflammation, glomerulosclerosis, and hyalinized tubules and arterioles. Chemical analysis of vitreous fluid revealed elevated glucose (543 mg/dl) consistent with the history of diabetes mellitus. Other laboratory values of the vitreous fluid included sodium, 127 mmol/L; potassium, 13.9 mmol/L; chloride, 111 mmol/L; blood urea nitrogen, 18 mg/dl; and, creatinine, 0.6 mg/dl. Postmortem toxicology was noncontributory.

A Gram stained smear of the pericardial fluid showed moderate neutrophils and no organisms, while the culture showed mixed bacteria (rare group B *Streptococcus*, rare viridans group *Streptococcus*, and rare coagulase-negative *Staphylococcus*). A tissue Gram-stained smear of the vegetation and the myocardial abscess showed abundant delicate, filamentous gram-positive rods without branching and occasional irregularly shaped gram-positive rods that were thought to be a morphologic variant of the same organism (Fig. 2). The vegetation and abscess were not submitted for culture. Gram stains and culture of the lung and cerebrospinal fluid were negative for routine bacterial pathogens. No respiratory viruses were isolated from the nasopharynx. Gram-positive rods were isolated from a single postmortem blood culture. The isolate grew on sheep blood agar (SBA) as small colonies with beta-hemolysis. The isolate was negative for catalase, oxidase, indole, and motility but positive for the reverse CAMP test (Fig. 3). The API Coryne biochemical system identified the organism as *A. haemolyticum*. The identification of the isolate was confirmed by

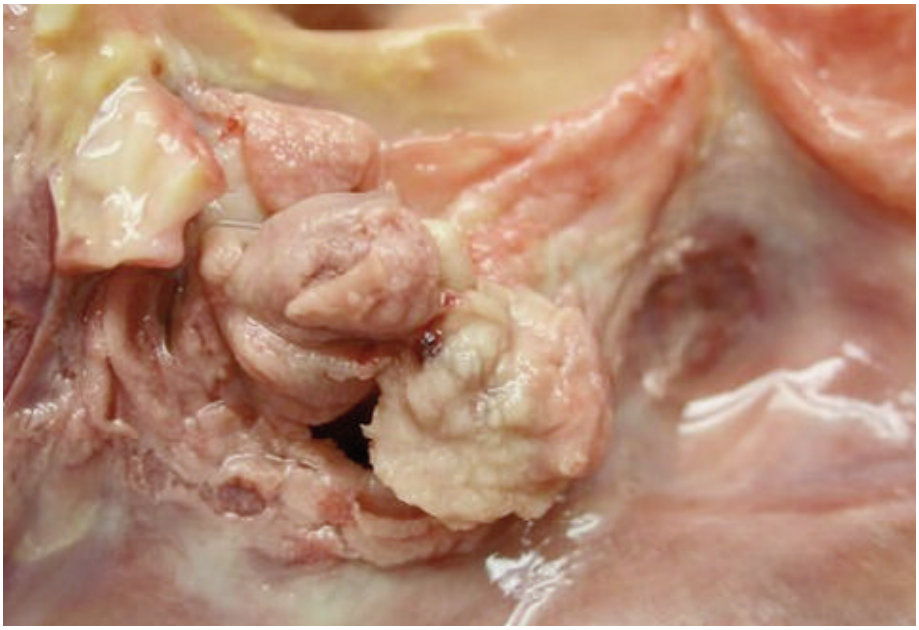

Figure 1. Postmortem bicuspid aortic valve showing a large, soft, tan vegetation attached to the ventricular side of the anterior cusp.

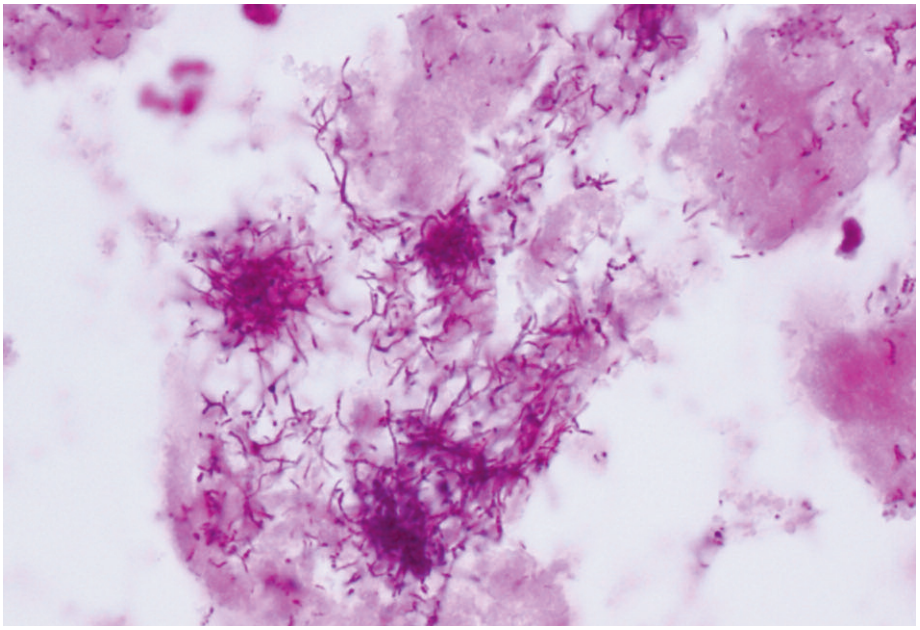

Figure 2. Tissue Gram stain of the vegetation (original magnification, ×100), showing abundant, delicate, filamentous gram-positive rods without branching.

16S rRNA sequencing using the Applied Biosystems MicroSeq 500 16S rRNA bacterial identification kit. An attempt was made to directly identify the organism from the formalin-fixed aortic vegetation tissue, but this was unsuccessful because of degradation of the DNA secondary to fixation. On the basis of the investigation report and review of the medical record and autopsy findings, the cause of death was acute heart failure due to a ruptured aortic valve caused by *A. haemolyticum* infective endocarditis in the setting of a congenital bicuspid aortic valve. Diabetes and hypertension were also predisposing factors.

Discussion

A. haemolyticum was first described and named (as *Corynebacterium haemo-*

