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CASE REPORT

A complicated case of Kingella kingae endocarditis and review of the literature

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Abstract

Kingella kingae is responsible for 5% of HACEK infective endocarditis. We describe the intracerebral ischaemic and haemorrhagic complications of Kingella endocarditis. A review of 21 available adult cases shows that patients are relatively young and have more vascular and immunological complications. The mitral valve was mostly involved, 20% had congestive heart failure and 23% cerebral complications. Penicillins and cephalosporins should be used.

Introduction

Infective endocarditis is an infection of the endocardium that usually involves the (prosthetic) valves and adjacent structures. Common complications of infective endocarditis are heart failure (32%), stroke (17%), embolisation other than stroke (23%) and intracardiac abscess (14%).[1] Staphylococci and streptococci cause infective endocarditis in 42 and 40% respectively.[1] HACEK is an acronym for *Haemophilus, Aggregatibacter, Cardiobacterium, Eikenella* and *Kingella* species and is responsible for 2% of infective endocarditis. Since the clinical expertise with infective endocarditis caused by *Kingella kingae* is extremely limited, we describe a case of endocarditis caused by *Kingella kingae* and review the current literature.

Case report

A 40-year-old male was admitted with an eight-day history of fever, myalgia, arthralgia and chills. His medical history included Wolff-Parkinson-White syndrome, for which accessory bundle ablation was performed three years previously. A supracoronary replacement of the ascending aorta (Vascutek Gelweave Straight prothesis) and mechanical aortic valve replacement (Carbomedics 27 mm) was performed 15 months earlier because of aortic valve stenosis and aortic aneurysm. The symptoms on admission were fever (39°C) and a Levine grade II/VI systolic murmur at the third left intercostal space. The valve clicks were clear and normal on auscultation. No other stigmata of endocarditis were found on clinical examination. Laboratory evaluation showed a leukocyte count of 11.5 x 10^9/l and a C-reactive protein of 212 mg/l. On transthoracic and subsequent transoesophageal echocardiographic examination the prosthetic aortic valve showed grade 1 aortic regurgitation, but no signs of paravalvular leakage, vegetations or paravalvular abscess formation. Because the differential diagnosis included prosthetic valve infective endocarditis (more than 12 months in situ) of unknown origin in combination with penicillin allergy, vancomycin and gentamicin were started after blood cultures were drawn in accordance with the local protocol and aiming at the most common organisms. Despite this treatment, a few hours after admission he developed dysarthria and left-sided sensibility loss. A computed tomography (CT) scan of his brain was, however, unremarkable, but a magnetic resonance imaging (MRI) scan showed cytotoxic oedema on the right side of the cerebellum, indicating ischaemia and suggestive of cerebral embolism. CT angiography was performed, which showed some oedema around the ascending aortic prosthesis and an aneurysm of the right superior cerebellar artery, likely a mycotic aneurysm. A magnetic resonance angiogram of the cerebral arteries (performed after the patient consulted a neurologist because of the death of his mother due to intracranial bleeding) one month earlier had shown no abnormalities. In the meantime, the blood cultures yielded Gram-negative bacteria for which ceftriaxone was added to the antibiotic treatment. A multidisciplinary team decided that valve replacement was contraindicated because of the risk

of cerebral bleeding. Three days after admission, the patient was transferred to the nearest hospital with a neurosurgical department for surgery for his intracranial aneurysm. Now the MRI scan showed thrombosis of the aneurysm and new ischaemia in the pons and mesencephalon. No intervention was performed and the antibiotic treatment was continued. A positron emission tomography (PET) CT scan was suggestive of infection of the ascending aortic prosthesis with two small abscesses proximal of the prosthesis. A few days later, bleeding from the intracranial aneurysm occurred and the patient was admitted to the intensive care unit. Decompressive craniectomy and placement of an extra-ventricular drain because of hydrocephalus restored his consciousness. Planned coiling of the aneurysm failed because of severe vasospasm. The patient's clinical condition deteriorated with coma and multiple organ failure despite supportive intensive care treatment. An MRI scan showed new cerebral ischaemia, including signs of raised intracranial pressure and progressive cerebral oedema. This resulted in death three weeks after his first presentation to the hospital. Blood cultures yielded *Kingella kingae*. Autopsy confirmed intracranial hypertension due to extensive ischaemia, oedema and secondary hydrocephalus.

Literature review

A literature search in PubMed for *Kingella* endocarditis in adult patients and a subsequent search for additional cases using the reference list of selected articles resulted in 21 cases that are included in this analysis *(table 1)*.[2-19] Native mitral valve endocarditis was the most common type. Most patients had a history of cardiovascular disease and four patients were immunocompromised because of systemic lupus erythematosus or the acquired immune deficiency syndrome. Five patients (23%) developed congestive heart failure as a complication of the *Kingella kingae* endocarditis, four patients (19%) suffered from cerebral embolism and two patients died as a result of these complications.

The HACEK group of bacteria frequently colonises the oropharynx and has been recognised as a cause of infective endocarditis, although the incidence is low, ranging from 0.8-6% of all patients with infective endocarditis. This pathogen is mainly described in paediatric patients with infective endocarditis.[20] HACEK endocarditis was caused by *Kingella kingae* in only 5% of all patients. *Kingella* shows some specific features such as young age, prosthetic valve involvement and stroke as a complication.

Table 1. Summary of cases of Kingella kingae endocarditis in adult patients

Author	Age	Gender	Valve	Native/	ten	ten	ten
Huhn, 1973	21	F			SLE	cephalotin, kanamycin	CHF
Miridjanian, 1978	28	M				penicillin	Transient expressive aphasia
Ravdin, 1982	58	F	Mitral	N		penicillin, gentamicin	CVA
Geraci, 1982	2 adults			N & P		penicillin, gentamicin, ampicillin	
Lion, 1982	43	M			Rheumatic heart disease and triple valve graft	penicillin, gentamicin	
Sage, 1983	26	M	Mitral	P	Rheumatic heart disease	ampicillin, tobramycin	
Adachi, 1983	58	F	Mitral	N		ampicillin, tobramycin	
Odum, 1984	66	F	Mitral	N	Calcified aorta	penicillin	CHF
Odum, 1984	30	F	Mitral	N	SLE with cardiac involvement	ampicillin	
Odum, 1984	68	F	Mitral	N	Rheumatic heart disease	ampicillin, penicillin, streptomycin	CHF, died
Claesson, 1985	56	M	Aortic	P	Aortic valve stenosis	benzylpenicillin, tobramycin	
Verbruggen, 1986	30	M			Congenital heart disease	penicillin, tobramycin	CHF, surgery, died
Wolff, 1987	63	M	Mitral	P	Rheumatic heart disease	cefoperazon, penicillin	CHF, CVA
Giamarellou, 1987	41	M	Aortic	P		ciprofloxacin	Persistent bacteremia
Kerlikowske, 1989	34	F	Aortic	N	AIDS, aortic insufficiency	ceftriaxon, ampicillin, gentamicin	
Chakraborty, 1999	52	M	Aortic	P	Aortic dissection	ampicillin, gentamicin	
Wolak, 2000	21	F	Mitral	N	SLE, antiphosfolipid syndrome	ceftriaxon, penicillin, gentamicin	Meningitis
Lewis, 2000	53	M	Aortic and mitral	N		cefotaxim	CVA
Korach, 2009	59	F	Aortic and mitral	P	Rheumatic heart disease	ampicillin, gentamicin, ceftriaxon	Paravalvular abscess, surgery
Bagherirad, 2013	51	F	Mitral	N		ceftriaxon	Valve perforation, surgery
Present case	40	M	Aortic	P	Congenital heart disease	gentamicin, ceftriaxon	CVA, mycotic aneurysm, died
Huhn, 1973	21	F			SLE	cephalotin, kanamycin	CHF

Age in years. M: male. F: female. N: native. P: prosthetic. SLE: systemic lupus erythematosus. CVA: cerebrovascular accident. CHF: congestive heart failure. AIDS: acquired immunodeficiency syndrome.

Third generation cephalosporins are the preferred treatment for HACEK endocarditis, including Kingella.[21] The empiric antibiotic choice according to the clinical guidelines for infective endocarditis does not cover all HACEK microorganisms. As a result, HACEK endocarditis is usually inappropriately treated until it is recognised. Another reason for delayed treatment is that the features of HACEK endocarditis are unspecific and of limited help in clinical practice to distinguish HACEK from non-HACEK endocarditis. Positive blood cultures and progression of disease under treatment are useful clinical alarm signals.

Discussion of the case

Our case is the first to describe mycotic aneurysm as a complication of *Kingella kingae* endocarditis. Our case has some other remarkable features that can add to the current knowledge of *Kingella kingae* endocarditis. The clinical presentation is characterised by severe disease on admission and fast progression over time. This may be related to the relatively late presentation, since the fever had been present for eight days before admission to the coronary care unit. In addition, the empiric treatment with vancomycin and gentamicin was suboptimal. Gentamicin may have had some effect, but should have been combined with penicillin or another beta-lactam antibiotic. With a few days delay ceftriaxone was added to the antibiotic regime. It is well known from previous studies that embolic events are a major cause of morbidity and mortality in patients with infective endocarditis, with an incidence ranging from 10-50%.[1] Up to 65% of these embolic events involve the central nervous system, with mortality ranging from 20-58%. The risk of stroke in infective endocarditis falls rapidly and dramatically after the initiation of effective antimicrobial therapy.

In conclusion, *Kingella kingae* is a rare cause of infective endocarditis. Patients with *Kingella* endocarditis are relatively young, have more vascular and immunological complications such as stroke, and prosthetic valves appear to be more at risk. The current standardised treatment regime with broad antibiotic therapy must be adjusted after identification of the causative microorganism. Our case shows extensive intracerebral ischaemic and haemorrhagic complications of a prosthetic valve endocarditis and infected supracoronary ascending aortic prosthesis.

Disclosures

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