

Kingella kingae Prosthetic Valve Endocarditis Complicated by a Paravalvular Abscess

Amit Korach MD¹, Karen Olshtain-Pops MD², David Schwartz MD³ and Allon Moses MD²

Departments of ¹Cardiothoracic Surgery and ²Clinical Microbiology and Infectious Diseases, Hadassah Medical Center, Jerusalem, Israel

³Microbiology Laboratory, Tel Aviv Sourasky Medical Center, Tel Aviv, Israel

KEY WORDS: endocarditis, prosthetic valve, *Kingella kingae*, paravalvular abscess

IMAJ 2009;11:251–253

K*ingella kingae* is a gram-negative bacillus, recognized as an infrequent cause of native valve endocarditis. Prosthetic valve endocarditis caused by this organism has been described in eight cases only. The bacteria seem to be mildly virulent and the clinical course reported in these cases has been favorable. Complications such as a paravalvular leak, abscess formation and need for re-operation have not been previously described. We present a case of *Kingella kingae* endocarditis in a patient with prosthetic aortic and mitral valves who developed an aorto-mitral continuity abscess that necessitated complex surgical intervention

PATIENT DESCRIPTION

A 59 year old woman was admitted to another hospital with fever and chills. She had been feeling well until 3 days earlier, when a fever of 39°C appeared abruptly. The fever was accompanied by chills and fatigue, without additional symptoms. She was initially diagnosed with a viral infection, but when the fever persisted for 3 days she decided to seek medical attention.

She had a history of rheumatic heart disease, which resulted in severe aortic valve stenosis and mitral valve incompetence. Ten months prior to her present admission she underwent aortic and mitral valve replacement with

mechanical valves (Medtronic Hall 20 mm and St. Jude 27 mm respectively). The operative and postoperative course was unremarkable. The pathological examination of the valves demonstrated fibrotic-calcified valves with no evidence of infectious endocarditis.

She denied recent dental procedures, oral ulcers or pharyngitis, as well as skin infection and intravenous drug abuse. On physical examination she looked ill and had a temperature of 39.5°C. There was no evidence of pharyngitis or oral ulcers and she had overall good oral hygiene. Both prosthetic valve sounds were clearly auscultated and peripheral stigmata of infectious endocarditis were absent. The rest of the physical examination was unremarkable. The white blood cell count was 19,000/mm³. Transesophageal echocardiography demonstrated a 2 cm vegetation adhered to the anterior aspect of the prosthetic mitral valve sewing ring, protruding into the left atrium. Blood cultures were drawn, and empiric antibiotic treatment was initiated.

Blood cultures were incubated in the BacT Alert system (bioMérieux, Inc., Durham, NC, USA). Growth was detected 3 days after cultures were obtained in the one blood culture drawn initially, as well as in one of three cultures drawn 1 day later. A Gram stain of the broth showed gram-negative coccobacilli with tapered ends. Analysis of the isolate, based on its biochemical properties, yielded *Kingella kingae* with 100% probability.

The MIC of penicillin, ceftriaxone and vancomycin, determined by E test (AB Biodisk, Solna, Sweden) was 0.032 µg/

ml, 0.047 µg/ml and 64 µg/ml, respectively. Following these results, a combination of ampicillin and gentamicin was initiated. Since the patient remained febrile, her antibiotic treatment was switched to intravenous ceftriaxone, and she was transferred to our institution at her request.

Upon arrival at our hospital, a temperature of 39°C was measured. The patient's WBC count was 20,000/mm³. An additional TEE did not demonstrate any change in vegetation size and did not disclose a paravalvular leak or abscess. Repeated blood cultures were sterile. Intravenous gentamicin was added to the treatment regimen. Following this addition the fever gradually subsided and the leukocyte count declined. Since the patient's clinical condition was stable, blood cultures were sterile and the echocardiogram showed no evidence of complications, and in view of the relatively benign reported course of *Kingella kingae* endocarditis, it was decided to maintain conservative therapy. However, mild fever and leukocytosis persisted, and a follow-up TEE, performed nearly 4 weeks after appearance of symptoms, revealed a newly defined abscess at the aorto-mitral continuity.

The patient was taken to the operating room where a 1 cm cavity was demonstrated at the aorto-mitral continuity. The cavity was completely excised and both prosthetic valves were replaced (mitral: SJM 27 mm, aortic: Medtronic Hall 20 mm). The excised cavity was sent to the microbiology laboratory,

WBC = white blood cells

TEE = transesophageal echocardiography

Table 1. Summary of reported cases of *Kingella kingae* prosthetic valve endocarditis

Patient no.	Reference	Age/Gender	Valve	Antibiotic treatment	Complications	Need for surgery
1	Geraci (3)	–	Artificial	Penicillin, gentamicin	–	–
2	Rabin	9/F	Previous repair of truncus arteriosus and AVR	Penicillin G (6 wks), gentamicin (5 days)	–	–
3	Grant	16/M	Aortic	Ampicillin (6 wks), gentamicin, penicillin V	–	–
4	Sage	26/M	Mitral	Ampicillin (6 wks), tobramycin (2 wks)	–	–
5	Cleasson	56/M	Aortic	Tobramycin, penicillin (6 wks)	–	–
6	Wolf	63/M	Mitral	Cefoprazon (3 wks), penicillin G (3 wks)	CHF CVA	–
7	Giamarellou [4]	41/M	Aortic	Ciprofloxacin (3 wks)	Persistent bacteremia	–
8	Chakraborty [5]	52/M	Aortic	Ampicillin (4 wks), gentamicin (4 wks) Amoxicillin (2w)	–	–
9	Our case	59/F	Aortic and mitral	Ampicillin, gentamicin, ceftriaxon	Paravalvular abscess	++

AVR = aortic valve replacement with mechanical Bjork-Shiley valve, CHF = congestive heart failure, CVA = cerebrovascular accident

but cultures were sterile. The patient remained afebrile after the operation, but an increasing paravalvular leak developed. She was sent to another hospital for a definitive operation. At that operation, the fibrous skeleton of the heart was reconstructed, the aortic root was replaced by a tube graft, and new prosthetic valves were implanted (SJM 27mm, and 23 mm respectively). She was treated with IV penicillin for 6 weeks during which she remained afebrile, without further evidence of infection. She was well on her 15 month follow-up examination.

COMMENT

Kingella kingae was first recognized in 1960 by Dr. Elizabeth King at the U.S. Centers for Disease Control. It belongs to the family Neisseriaceae. Three additional species belong to this genus: *K. indologenes*, *K. denitrificans* and the newly described *K. oralis*.

K. kingae is an aerobic gram-negative Coccobacillus, commonly arranged in

pairs or short chains. It is an occasional normal inhabitant of the oropharynx. In addition, it has been implicated as the cause of disease in soft tissue infections, bone and joint infections, bacteremia and endocarditis. It is speculated that disrupted respiratory or buccal mucosa may facilitate bacterial invasion and hematogenic dissemination, since invasive disease has frequently been associated with concomitant or precedent upper respiratory tract infection or stomatitis.

Nearly 90% of all cases with invasive *K. kingae* infections reported in the medical literature have involved children less than 5 years old [1]. In this age group the most common presentation was that of an osteoarticular infection. In adult patients, however, endocarditis is one of the more common presentations of infection. This bacterium belongs to the HACEK group of organisms (including *Haemophilus* sp., *Actinobacillus* sp., *Cardiobacterium hominis*, *Eikenella corrodens* and *Kingella* sp.) reportedly responsible for nearly 3% of commu-

nity-acquired cases of endocarditis. A recent study conducted in Israel demonstrated that among 100 patients diagnosed with infective endocarditis, 1 (1%) had a proven infection caused by one of the HACEK organisms [2].

Since the first description of *Kingella* endocarditis by Christensen in 1967, close to 40 cases have been reported, involving native as well as prosthetic valves. In the vast majority of these patients, the response to antimicrobial therapy was good, with valve replacement generally being unnecessary. Of interest to us were the eight reported cases involving prosthetic valves [Table 1]. The first case of prosthetic valve *Kingella kingae* endocarditis was described by Geraci in 1982 [3]. He reported 56 patients with gram-negative endocarditis, only one of which was caused by *Kingella kingae* on a prosthetic valve. The patient was cured following antibiotic treatment alone. Five additional case reports all described patients who responded well to antibiotic therapy, without serious complications or need for surgical intervention. The

two remaining case reports illustrate the potential complications. The first describes a 63 year old man who experienced a cerebral vascular accident on the second day of treatment and signs of heart failure on the 19th day [4]. Rapid clinical improvement appeared with the commencement of penicillin therapy. There was no need for surgical intervention. The second case was that of prosthetic valve *Kingella kingae* endocarditis treated with ciprofloxacin [5]. The patient improved clinically while receiving ciprofloxacin, yet bacterial growth in cultures persisted. There was no mention of surgical intervention in this case.

The cases mentioned above give the impression that prosthetic valve endocarditis caused by *Kingella kingae*

has a favorable outcome. Our report is therefore an unusual example of a severe pyogenic and mechanical complication. Our patient was diagnosed with *Kingella kingae* endocarditis of a prosthetic valve. Despite appropriate antibiotic therapy, she developed an aorto-mitral continuity abscess and her valve was completely destroyed. This complicated course of events, to the best of our knowledge, has not been previously reported with *Kingella kingae* endocarditis. Our report suggests that not all prosthetic valve *Kingella kingae* endocarditis cases are as benign as can be interpreted from the current literature. Mechanical complications and abscess formation may develop despite appropriate antibiotic therapy, and early operative intervention should be considered.

Correspondence:

Dr. K. Olshtain-Pops

7 Hahalutz St., Jerusalem 96261, Israel

Phone: (972-2) 678-0791

Fax: (972-2) 678-7249

email: pops@zahav.net.il

References

1. Yagupsky P, Dagan R. Population-based study of *Kingella kingae* infections. *Emerg Infect Dis* 2000; 6: 85-7.
2. Gotsman I, Meirovitz A, Meizlish N, et al. Clinical and echocardiographical predictors of morbidity and mortality in infective endocarditis: the significance of vegetation size. *IMAJ* 2007; 9: 365-9.
3. Geraci JE, Wilson WR. Endocarditis due to gram-negative bacteria. Report of 56 cases. *Mayo Clin Proc* 1982; 57: 145-8.
4. Giamarellou H, Galanakis N. Use of intravenous ciprofloxacin in difficult to treat infections. *Am J Med* 1987; 82(Suppl 4A): 346-51.
5. Chakraborty RN, Meigh RE, Kaye GC. *Kingella kingae* prosthetic valve endocarditis. *Ind Heart J* 1999; 51: 438-9.