CASE REPORT

A rare native mitral valve endocarditis successfully treated after surgical correction

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SUMMARY

Mycobacterium abscessus and *Kocuria* species are rare causes of infections in humans. Endocarditis by these agents has been reported in only 11 cases. *M. abscessus* is a particularly resistant organism and treatment requires the association of antibiotics for a prolonged period of time. We report a case of native mitral valve bacterial endocarditis due to *M. abscessus* and *Kocuria* species in a 48-year-old man with a history of intravenous drug use. The case was complicated by a perforation of the posterior mitral valve leaflet, leading to surgical mitral valve replacement. Cultures from the blood and mitral valve disclosed *M. abscessus* and *Kocuria* species. The patient was treated for 6 months with clarithromycin, imipenem and amikacin, with resolution of symptoms. Repeated blood cultures were negative. Acid-fast staining should be done in subacute endocarditis in order to identify rapidly growing mycobacteria.

BACKGROUND

Mycobacterium abscessus is a non-tuberculous, rapidly growing mycobacteria (RGM).[1] This organism has been known to cause a wide variety of clinical diseases in humans, including skin and soft tissue infections, keratitis, catheter-related sepsis, osteomyelitis, septic arthritis and pulmonary infections.[2–4] *M. abscessus* is also a rare aetiology of endocarditis. Only eight cases of *M. abscessus* endocarditis have been published in the literature. *Kocuria* species are Gram-positive bacteria rarely associated with human disease. There have been case reports of *Kocuria*-associated cholecystitis, bacteraemia and peritonitis.[5–10] Only three cases of *Kocuria* endocarditis have been published. To the best of our knowledge, we present the first case of endocarditis due to *M. abscessus* and *Kocuria* species.

CASE PRESENTATION

A 48-year-old Ukrainian man who had lived in the USA for 15 years, with a medical history significant for intravenous drug use, was admitted with a history of subjective fever, diffuse abdominal pain with blood per rectum and shortness of breath for 1 week. On interview, the patient endorsed night sweats and an unintentional 10-pound weight loss over the previous 2 months. He also mentioned worsening dyspnoea on exertion and dry cough. The patient had used intravenous drugs for 2 years, including crushed roxicet and cocaine. He admitted to last using drugs 2 days prior to admission and denied sharing syringes. On physical examination, the patient was febrile at 103°F; blood pressure 95/56 mm Hg; radial pulse 132 irregular beats per minute (bpm); 20 breaths/min; and oxygen saturation of 95% at room air. Auscultation was significant for a grade 3 pansystolic murmur at the apex radiating to the axilla. ECG disclosed atrial fibrillation with rapid ventricular response; laboratory analysis revealed a total white cell count of 15 000 cells/mL, with 89.2% of neutrophils; haemoglobin 11.1 mg/dL and haematocrit 35.4%. CT with contrast of the abdomen disclosed proximal coeliac artery thrombosis extending into the splenic artery. The superior mesenteric artery was intact. A transthoracic two-dimensional echocardiogram (2D echo) revealed mitral regurgitation with an anteriorly and medially regurgitant flow jet with regurgitant volumes of 70 mL, regurgitation fraction of 55% and a proximal isovelocity surface area radius of 1.1 cm. There was a large mitral leaflet vegetation of almost 2 cm (figure 1). The patient was started empirically on treatment for infectious endocarditis with intravenous vancomycin, ceftriaxone and gentamicin. Management consisted of β-blockers for atrial fibrillation rate control, intravenous fluids and vasopressors for sepsis and a heparin drip for thrombosis of the coeliac artery.

The patient presented with partial clinical improvement for the following 2 days. Atrial fibrillation persisted, but rate controlled at 90 bpm and blood cultures drawn initially revealed *Enterococcus faecalis*. Antibiotics were subsequently switched to ampicillin and gentamicin after 3 days on the prior regimen. The transoesophageal echocardiogram disclosed a small patent foramen ovale and 1.9 cm vegetation (figure 2) with associated perforation in the posterior mitral valve leaflet (figure 3) leading to severe mitral regurgitation (figure 4). As the patient presented with an altered mental status and febrile state; a CT of the brain was obtained and it did not

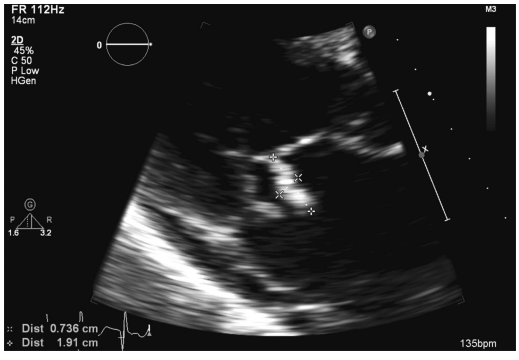

Figure 1 Large vegetation on mitral valve (1.9 cm).

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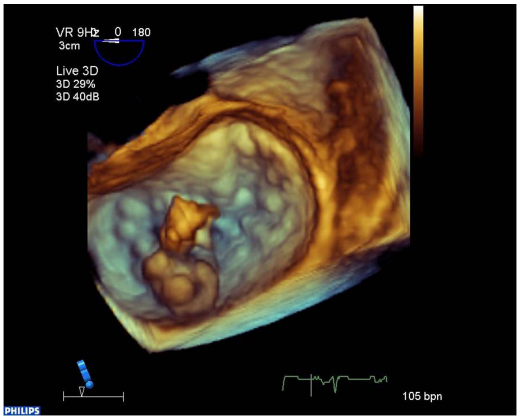

Figure 2 Perforation of the mitral valve posterior leaflet, resulting in severe mitral regurgitation.

show any signs of acute ischaemia, thrombus or enhancing lesions suggestive of septic emboli. He improved later. Repeated-blood cultures after 6 days on ampicillin and gentamicin were started disclosed no growing organism. Therefore, surgical mitral valve replacement was done using a bioprosthetic valve rather than a mechanical valve in order to avoid anticoagulation therapy in a patient with questionable medication compliance. Postsurgical blood cultures and mitral valve tissue cultures revealed *Kocuria* species and *M. abscessus*. Culture results were based on colony morphology, pigmentation pattern, growth rate and results of biochemical testing. Ampicillin and gentamicin were then discontinued and the patient was started on amikacin, imipenem and clarithromycin. Since the patient was bacteraemic at the time of valve replacement, the replaced valve was considered to be infected and another surgery was indicated. Unfortunately, the patient had a poor nutritional status and became haemodynamically unstable, requiring intravenous pressors. He was deemed a poor surgical candidate. At this point, blood cultures revealed susceptibility only to amikacin and clarithromycin, so imipenem was discontinued. Another set of blood cultures after antibiotics adjustment still revealed *M. abscessus*. 2D echo was repeated and neither vegetation nor mitral regurgitation was observed on the prosthetic valve (figure 5). The patient was restarted on imipenem with amikacin and clarithromycin. Later, two blood cultures disclosed no growing organism. The patient did not hold medical insurance and therefore stayed in hospital for continued antibiotic and heparin administration for the following 6 months as an alternative treatment for a possibly infected prosthetic valve. Other investigative tests during his hospitalisation disclosed a negative HIV test and positive hepatitis C, genotyope 3a with 72 000 copies. He was never started on treatment for that. A repeated CT of the abdomen with contrast disclosed only stable areas of splenic infarct from previous arterial thrombosis. The final conclusion about the splenic artery thrombosis was due to septic emboli. After discharge, there was no follow-up as the patient never presented to outpatient clinic. He was admitted again 4 months after discharge, presenting with respiratory failure and septic shock. He expired on the next day due to multiorgan failure. Owing to the rapid deterioration of his condition, only a few investigative studies were conducted initially that included blood cultures. They disclosed *M. abscessus* as well.

INVESTIGATIONS

ECG: atrial fibrillation with rapid ventricular response; CT with contrast of the abdomen: proximal coeliac artery thrombosis extending into the splenic artery. The superior mesenteric artery was intact.

Transthoracic 2D echo: mitral regurgitation with a large mitral leaflet vegetation of almost 2 cm.

Blood cultures: initially *E. faecalis*, then *Kocuria* species and *M. abscessus*.

Transoesophageal echocardiogram: small patent foramen ovale and 2 cm vegetation with associated perforation in the posterior mitral valve leaflet leading to severe mitral regurgitation.

DIFFERENTIAL DIAGNOSIS

- Bacterial endocarditis
- Connective tissue disorder
- Tuberculosis
- Congestive heart failure

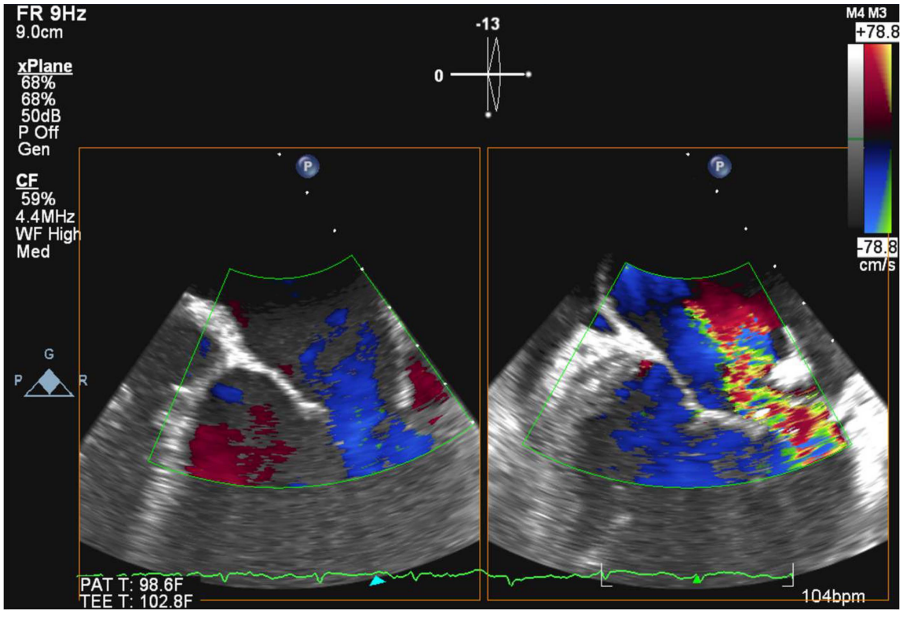

Figure 3 Three-dimensional transoesophageal echocardiogram discloses large vegetation on the mitral valve.

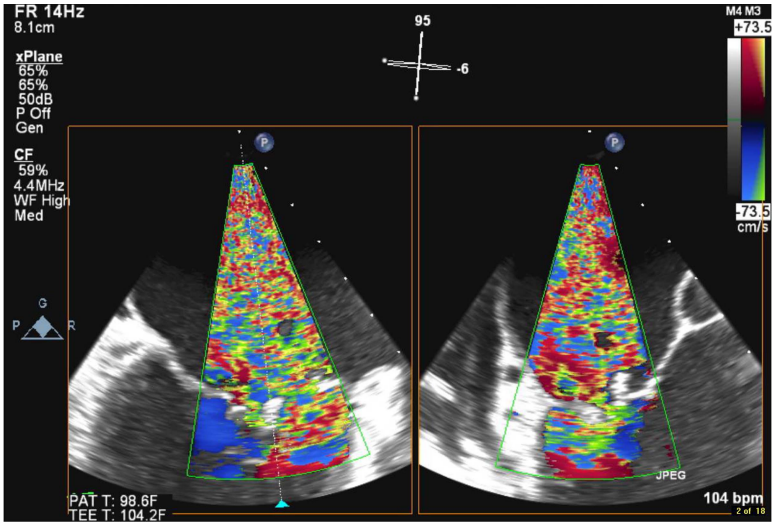

Figure 4 Severe mitral regurgitation flow by transoesophageal echocardiogram.

TREATMENT

- Surgical mitral valve replacement
- Clarithromycin, imipenem and amikacin

OUTCOME AND FOLLOW-UP

The patient was discharged after 6 months of antibiotics. He achieved resolution of symptoms and his blood cultures were repeatedly negative. He was lost to follow-up but was readmitted 4 months later with sepsis and expired on the day after his admission.

DISCUSSION

We presented a case of a concomitant bacteraemia and valve infection by *Kocuria* and non-tuberculous mycobacteria. On the basis of the course of the presentation, we believe that after manipulating the mitral valve for repair the bacteria might have gotten dislodged and spread to the blood. More interestingly, after he was successfully treated for 6 months, the same type of bacteraemia recurred 4 months later. This could be due to reinfection by intravenous drug use or the infection was not successfully treated.

Kocuria species are Gram-positive bacteria members of the *Micrococcus* family. The main agents are *K. kristinae*, *K. rosea*, *K. varians* and *K. palustris*. Infection with *Kocuria* in humans is extremely rare. A previous literature search from 1995 to 2010 identified only 15 cases.[6] Immunocompromised individuals are at greater risk. Only three cases of *Kocuria* endocarditis have been reported (table 1). Common risk factors were not identified in previously published cases.

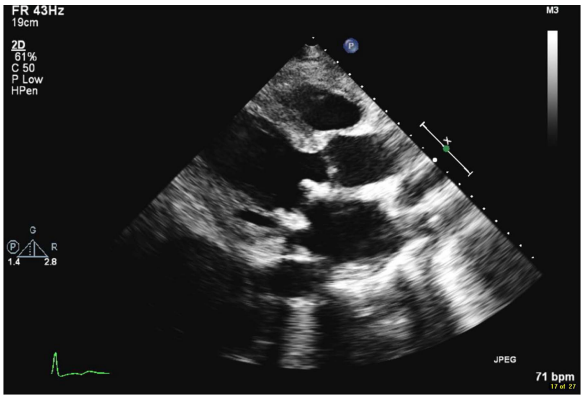

Figure 5 Bioprosthetic mitral valve in place; no mitral regurgitation or vegetations.

Unlike other non-tuberculous mycobacteria, RGM grow within 7 days in a wide variety of culture media.[1] The majority of infections due to RGM are caused by *M. abscessus*, *M. fortuitum* and *M. chelonae*.[19 20] *M. abscessus* is a ubiquitous bacteria; it can be identified worldwide in dust, soil and water.[20–22] Many risk factors have been associated with *M. abscessus* infections, such as haemodialysis, surgical procedures, immunosuppression, prosthetic devices and cystic fibrosis.[3 16 23–25]

Infective endocarditis due to *M. abscessus* is a rare condition. After a literature review, to the best of our knowledge, only eight cases have been reported (table 1). The mitral valve was affected in five cases and there was an equivalent distribution among native and prosthetic valves. The mortality of *M. abscessus*-related endocarditis is very high. We report the second case where the patient was successfully treated and discharged from the hospital. The main associated risk factors identified in a literature review were intravenous drug use, end-stage renal disease on dialysis and immunosuppression. In the current case, the patient endorsed intravenous drug use over the past 2 years.

Antibiotic resistance is an important issue in patients with *M. abscessus* infections. This organism is resistant to many antibiotics and there have been reports of variable susceptibility to chemotherapeutic agents.[19 26–29] Therefore, infections due to rapidly growing mycobacteria should be treated with at least two antibiotics.[30] The most commonly used antibiotics include amikacin, cefoxitin, clarithromycin, imipenem, linezolid and tigecycline.[11 20 31] No current guidelines include a recommended treatment for *Kocuria*-related endocarditis.[17] In our case, the patient was successfully treated with a prolonged triple regimen of amikacin, clarithromycin and imipenem.

Initial blood cultures from our patient disclosed *E. faecalis*. Treatment with gentamicin might have treated the *Enterococcus* infections, explaining why further cultures did not grow this organism. Another possibility is misidentification of *M abscessus*. In Switzerland, 50 samples of rapidly growing mycobacteria were sent to study participant centres for bacteriological investigation. Only 13 (26%) determined the correct diagnosis. The most common misdiagnosis was *Nocardia*.[32] Another study has reported misidentification of rapidly growing bacteria as *Corynebacterium*.[33] Given that *E. faecalis* and *M. abscessus* are Gram-positive bacilli, this misidentification is conceivable.

Table 1

First author	Age, gender	Valve affected	Organism	Risk factors	Culture source	Antibiotics	Disease duration, months	Antibiotic duration, weeks	Outcome
Al-Benwan[11]	54, male	Mitral, native	*Mycobacterium abscessus*	Hepatitis C, alcoholic cirrhosis, ESRD, haemodialysis	Blood, catheter-tip	Clarithromycin and tigecycline	5.5	7	Died
Altmann[12]	45, male	Aortic, prosthesis	*M. abscessus*	Previous endocarditis, rheumatic disease, recent aortic valve replacement	Blood, prosthesis	Lincomycin+cloxacillin	4.5	8	Died
Liebeskind[13]	35, male	Mitral, native	*M. abscessus*	NA	Blood, CSF, BM	Clarithromycin+imipenem	7	10	Died
Tsai[14]	29, male	Tricuspid, native	*M. abscessus*	IV drug use, previous endocarditis	Blood, sputum	Clarithromycin+amikacin +ciprofloxacin	9	14	Alive
Viscidi[15]	55, male	Mitral, prosthesis	*M. abscessus*	Rheumatic heart disease	Blood, urine, BM, sputum, wound	Amikacin, erythromycin, ethionamide	5	4	Died
Wallace[3]	53, male	Prosthesis	*M. abscessus*	NA	Blood	NA	NA	NA	Died
Wallace[3]	50, male	Prosthesis	*M. abscessus*	NA	Blood	NA	NA	NA	Died
Williamson[16]	29, female	Mitral, native	*M. abscessus*	ESRD, haemodialysis, renal transplant, anaemia, corticoid immunosuppression	Blood	Imipenem, clarithromycin, moxifloxacin	1.5	6.5	Died
Citro[17]	74, male	Mitral, native	*Kocuria kristinae*	Diabetes, hypertension, foot ulcer	Blood	Ampicillin–sulbactam +gentamicin	1	3	Died
Lai[7]	89, female	NA	*K. kristinae*	Ischaemic bowel disease status post surgery, TPN	Blood	Vancomycin+teicoplanin	NA	NA	Alive
Srinivasa[18]	35, male	Mitral, native	*K. rosea*	Rheumatic mitral regurgitation	Blood	Gentamicin+ceftriaxone	2	4	Alive
Present case	48, male	Mitral, native	*M. abscessus* and *Kocuria* species	IV drug use	Blood, mitral valve	Amikacin+clarithromycin +imipenem	8	24	Alive

BM, bone marrow; CSF, cerebrospinal fluid; ESRD, end-stage renal disease; IV, intravenous; NA, not applicable or not available; TPN, total parenteral nutrition.

The main indications for surgical treatment in endocarditis are mechanical complications and therapy failure. Possible mechanical complications that require surgical management include perforation, rupture, dehiscence, repeated embolic events from vegetations or a significant perivalvular abscess. In addition, persistent infection manifested by persistently positive blood cultures within 1 week of antibiotics also may require surgical treatment.[34 35] Our patient suffered a posterior mitral valve leaflet perforation with consequent severe mitral regurgitation and therefore required mitral valve replacement.

In conclusion, *M. abscessus* may represent an important aetiology of bacterial endocarditis. In negative cultures or in atypical cases of subacute endocarditis, particularly if antibiotic resistance is an issue, acid-fast staining should be done in order to increase the diagnosis of this infection.

Learning points

- *Mycobacterium abscessus* may represent an important aetiology of bacterial endocarditis, given that the agent may be underdiagnosed or misidentified.
- In atypical presentations, if cultures are negative or in antibiotic resistant cases, consider an acid-fast stain for rapidly growing mycobacteria.
- Infections due to *M. abscessus* should be treated with a combination of antibiotics for a prolonged period of time (at least 2 weeks).

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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